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[January, 1846.]

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BULLETIN OF MEDICAL SCIENCE.

EDITED BY

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TAMPLIN ON DEFORMITIES.

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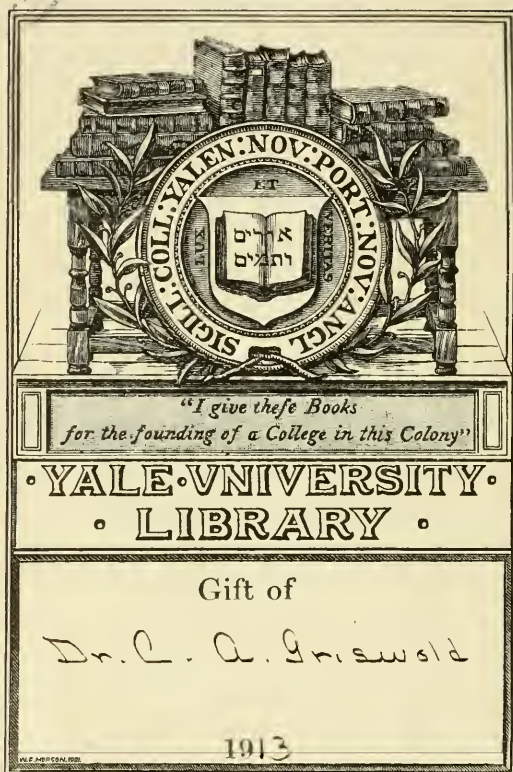
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LECTURES
ON
THE NATURE AND TREATMENT
OF
DEFORMITIES,

DELIVERED AT THE ROYAL ORTHOPÆDIC HOSPITAL,
BLOOMSBURY SQUARE.

BY
R. W. TAMPLIN, F.R.C.S.E.,
1845
SURGEON TO THE HOSPITAL.

WITH NUMEROUS ILLUSTRATIONS.

PHILADELPHIA:
ED. BARRINGTON AND GEO. D. HASWELL.
1846.



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TO
WILLIAM LAWRENCE, Esq., F.R.S.,

&c. &c.

DEAR SIR,

I have great pleasure in taking the first opportunity, that has presented itself, for me to acknowledge publicly the disinterested kindness, courtesy, and assistance, which I have on so many occasions received from you. I cannot disguise from myself the fact, that to the honour conferred by your attendance at the Charity at which these Lectures were delivered, are the Governors and the Public indebted, for a much more rapid acknowledgment of this subject as a legitimate branch of surgery, than could otherwise have been anticipated. That your life may long be spared, for the good of the public, and the profession of which you are so bright an ornament, is the sincere wish of,

Dear sir,

Your very faithful friend

and servant,

R. W. TAMPLIN.

Great Queen Street,
Lincoln's-Inn Fields.

January, 1846.

ADVERTISEMENT.

THE Lectures contained in the following pages were originally published in the **LONDON MEDICAL GAZETTE**. At the request of several friends, I have been induced to revise them, and to republish them, with some additions, in a separate form.

R. W. T.

CONTENTS.

LECTURE I.

	PAGE
INTRODUCTORY OBSERVATIONS	9

Deformities of the Foot.

LECTURE II.

On talipes equinus	23
“ “ treatment	35

LECTURE III.

Talipes varus congenitus	38
“ “ treatment	49

LECTURE IV.

Talipes varus non-congenitus	57
“ “ treatment	59
Talipes valgus	60
“ treatment	65
Talipes equino-varus, or talipes equino-valgus	70
“ “ “ “ treatment	72

LECTURE V.

Talipes calcaneus	75
“ “ treatment	77
Talipes calcaneo-valgus	79
“ “ treatment	84

Deformities of the Knee-joint.

LECTURE VI.

Genu valgum, or knock-knee	93
“ with outward inclination of the opposite knee	97
“ treatment of, by general means	103
“ “ “ by mechanical means	104
Genu extorsum, or outward inclination of the knees	108
“ “ treatment of, by general means	110
“ “ “ “ by mechanical means	110

LECTURE VII.

Division of the vastus externus and fascia lata for knock-knee	112
Relaxed condition of the ligaments of the knee-joint, admitting of undue motion posteriorly	112
“ “ “ treatment	113
Contraction of the knee commonly called ankylosis	114
Congenital	115
Non-congenital	116
Causes of non-congenital acting directly	116
Injuries of various kinds	116
Inflammation simply	119
Rheumatism	119
Scrofulous disease, or “white swelling,” with abscesses about the joint	119
Treatment	122
Indirect causes	128
Injuries to the spine	128
Cerebral or spinal irritation	129

LECTURE VIII.

Treatment of contraction of the knee-joint in the flexed position	
—mechanical and surgical	129
Means of forming a diagnosis	130
Case of contraction from inflammation successfully treated mechanically	150
Signs which may be considered favourable	131
Signs which are unfavourable	132
Section of semi-membranosus, semi-tendinosus, and biceps	133
Mode of performing the operation	133
Contraction of the gastrocnemius as a consequence	135
“ flexors and abductors of the hip as a consequence	136
Treatment	137
Dislocation backwards of the tibia on the femur	138
Treatment	139

LECTURE IX.

Contraction of the knee-joint in a straight or extended position	142
Congenital	142
Non-congenital	143
Case of congenital contraction of the thighs, knees, and feet	143
Causes of non-congenital contraction; injuries to the joint —	
position — chronic inflammation	143
Treatment, surgical and mechanical	144
Division of the rectus femoris	144
Contraction of the hip-joint	146
Congenital	146
Non-congenital	147
Causes of non-congenital	147
Cerebral or spinal irritation or disease	147
Injuries to the spine	147
Position	148
Rheumatism	148
Idiopathic inflammation	149
Treatment	150

LECTURE X.

Rachitis — true	156
“ false	160
“ treatment	161

LECTURE XI.

Angular curvature of the spine	164
Pott's disease — nature and treatment	165
Treatment of angular curvature of the spine	171

LECTURE XII.

Posterior curvature of the spine	173
Lateral curvature	177

LECTURE XIII.

Lateral curvature of the spine (continued) — generally relaxed condition of the ligaments of the spine, without permanent deformity, existing after puberty	184
Treatment of lateral curvature	185
Cases which may be considered curable, or capable of being relieved	186
Cases incurable, or admitting only of support	187

LECTURE XIV.

Wry neck	193
Treatment	196
Contraction of the lower jaw	198
“ shoulder-joint	199
“ arm	200
“ fore-arm	202
“ wrist and fingers	204
“ toes	211

ERRATUM.

The word “examination” is omitted at the commencement of page 201.

ON THE
NATURE AND TREATMENT
OF
DEFORMITIES.

LECTURE I.

INTRODUCTORY OBSERVATIONS.

UNTIL a recent period deformed patients were left almost entirely in the hands of mechanists, and it is, as you are aware, but a very short time since the scientific treatment of deformities was introduced into this country. It is not more than twenty-eight years since the principles on which we are now successfully treating deformities were practiced by Delpech, and afterwards published, so that time has not yet elapsed for this treatment to have become general; nor can opportunities have presented themselves for a very extensive field of inquiry, save at institutions especially devoted to the treatment of deformities, and perhaps at the large hospitals of the metropolis. And here I cannot omit to mention the benevolent exertions of Mr. Quarles Harris, who, having experienced relief in his own family, devoted himself to the formation and support of this Charity, for the benevolent purpose of extending the same benefits to the poor, which he knew the rich could command. It is to Mr. Harris's unceasing benevolence and unwearied exertions that we are indebted for its present existence.

By the term deformity is meant any and every deviation from the recognised symmetrical proportions of the human frame; but the word is more definitively applied to those irregularities of form which consist in a partial deviation from the natural position of the body, unaccompanied by malformation of the general original structure. I may here observe,

that it is probably to a conviction on the part of the profession that club-feet are actual malformations, that we are to ascribe the unaccountable fact of this species of distortion having almost to the present day been left without rational or truly scientific attempts made to remedy it.

This, however, is one of those useful lessons that teach us the necessity of perpetual study, and remind us that however great the advances already made, the field of inquiry is still open and inexhaustible; that the healing art is not one in which we can ever rest supine, but, on the contrary, that it calls for constant activity and unwearying perseverance. It must be continually borne in mind that science is ever progressing, and that it is the duty of every worthy member of the profession diligently to search out, and impartially to investigate, any new system which has for its object the alleviation of human suffering, notwithstanding its departure from the trodden path of established practice. True it is, that there are, and ever will be, "Will-o'-th'-Wisp" presenting themselves under every form of quackery, and that it behoves us to use every effort to distinguish the true from the apparent, the essential from the ideal; yet must we never be deterred by timidity or prejudice from endeavouring to advance the science of which we have the honour to call ourselves professors. I say honour, because there is no higher pleasure, no greater distinction, no more exalted exercise of the human mind, than that profession which has for its object the benefit of our species, and the mitigation and removal of those ills to which all of mortal birth are subjected. To the visitation of deformity this remark applies with double force, for the deformed have been regarded as loathsome in body, and depraved in mind; they have often isolated themselves from their fellow creatures; persecution of them has ever been sanctioned by the Mosaic ceremonial, which admitted the unblemished alone to the dignity of the priesthood. Possessing all the feelings, and susceptible of all the impulses which animate the breast of man, frequently morbidly sensitive from the consciousness of their deformity, adorned with genius, gifted with wit, graced by fortune and by birth, crowned with learning, — still is the deformed man exposed to the derision of the heartless, and is shut out from the world simply because nature has played some freak by which he differs from his fellow mortals.

Nevertheless, history records the names of many whose spiritual excellence overcame their bodily deformity: Socrates, Æsop, Alexander the Great, whose head is said to

have inclined slightly to the left shoulder, the illustrious Lord Burleigh, Pope, Talleyrand, Sir Walter Scott, Flaxman, and Byron, were all deformed in different degrees. I believe the sole instance recorded by the classic poets of female deformity is a woman named Kutila, who lived to be a hundred ; she is spoken of by Pliny, and also by Juvenal. A facetious Englishman, named Hay, has written an Essay on Bodily Deformity, in which he good-naturedly and sensibly vindicates those labouring under such an affliction from the stigma so ungenerously cast upon them. He was himself deformed.

It is my intention in the ensuing lectures to confine myself as much as possible to facts ; for facts alone can be of service in the present condition of our knowledge of deformities. Theory is undoubtedly useful, but it too frequently, by its false colouring, destroys or obscures the principal objects that ought to be kept in view, and withdraws our attention from that which is really useful, to that which exists only in the imagination, and which not unfrequently impedes the progress of the subject with which it is connected.

It must be evident that to advance the theories that must occur to the minds of those who have had numerous opportunities of practice in one or other of the branches of surgery, would be to clog and encumber it to the apprehension of those who have not possessed similar advantages ; and they will derive much more useful information from facts themselves. For in what does the knowledge of surgery consist ? If analysed, we discover that it is an accumulation of facts handed down from one generation to another.

The principles laid down by Delpech, in his *Orthomorphie*, published at Paris in 1828, are comprised in the following rules : —

1st. “A tendon to be divided must not be exposed ; and its division should be made by turning the instrument on one side, so that the line of the incision may not be parallel to the division of the skin ; without this precaution risk of exfoliation of the tendon is incurred.”

2d. “Immediately after division of the tendon, the divided ends should be brought into contact with each other, and kept in this position by a suitable apparatus during the entire period necessary for their union.”

3d. “Inasmuch as it can only take place by the intervention of an intermediate fibrous substance, this substance, before it has become firm, can, and should be, extended gradually and carefully, until it has assumed a degree of length equal to the shortened muscle.”

4th. "When this degree of extension has been effected, the parts should always be fixed in the position, and kept so until the new substance has acquired its requisite degree of consolidation."

These, gentlemen, are the principles upon which we are now acting, and from which we depart but in the slightest degree; they embody the entire doctrine of the treatment of deformity, and have only to be followed out carefully to insure success. There can be no question that had Delpech been spared to enjoy the common number of years allotted to man, he would have extended to every variety of deformity, the new views which he so graphically announced. It was not only in deformity in the feet, and the physiology of the division of tendons, that Delpech shone so conspicuously, but also on lateral curvature of the spine, and on dislocations of all kinds, on which subjects his works must be considered as second to none in originality and in correctness of principle. It is gratifying to find, that Stromeyer, who has been fortunate enough to extend the treatment of the distinguished surgeon of Montpellier, has generously acknowledged the merits of Delpech; for he says, "Although the division of tendons has been recommended long since as a mode of removing certain contractions, yet the credit of having set this operation on a proper scientific basis undoubtedly belongs to Delpech, inasmuch as he showed the peculiar advantages derived from a new fibrous substance between the divided ends of the tendon, thus giving to this method of operating its true practical value, and enabling us to avoid rendering inactive the muscles whose tendons have been divided:" an acknowledgment on the part of Stromeyer which does equal credit to his head and heart. In his work "On Operative Orthopædic Surgery," Stromeyer observes—"Delpech laid it down as a rule, that the surgeon should encourage the formation of sufficient substance between the two divided ends of the tendon to maintain the function of the muscle, and should not destroy the new union by immediate extension, but commence extension some days after the operation: this rule is most important for the safe performance of orthopædic operations, and its value should be duly estimated. The idea that the elongation of the muscle is effected through the cicatrix, is a false one; the extent of the substance or cicatrix is quite inadequate for this purpose. In some cases of *pes equinus* the *gastrocnemii* are two or three inches too short; and, in wry neck, the *sterno-mastoid* is equally short, yet the cicatrix, after the cure, is but

a few lines long. The elongation of the muscle must be effected in these cases at the cost of its contractility, and thus the incision of its tendon acts not only on its mechanical, but also on its vital properties, and, by the temporary diminution of its irritability, its contractile power is diminished, and any increase of it prevented. This view is confirmed by observations made in cases where the tendons of sound muscles have been lacerated. The following is an instance: — A medical man, of lax fibre, ruptured his tendo-Achilles seven years ago, and, in spite of the injury, walked about a few days afterwards; at the present time he walks about, dragging his leg after him, like a paralytic man, although the cicatrix is only a few lines long, and would be only considered as likely to produce any lameness in those motions which require forcible contraction of the calf. The injury and subsequent want of use have evidently here caused a loss of power in the calf, which, in his feeble condition, could not readily be restored. It is a remarkable circumstance, that when the tendo-Achilles unites in an imperfect manner after injury, the foot is not drawn up by the flexor muscles, but hangs like a loosely connected part, showing that the diminished irritability of such a mass as the calf of the leg exerts a weakening influence on the entire extremity. That any person should commence extension immediately after the operation, and attempt to restore the limb to its natural position, using, like Sartorius, a degree of violence which makes us shudder to think of, is neither necessary nor advisable.”

“The immediate restoration of a limb in its natural position is not to be recommended, for by extension before the healing of the wound in the skin, the parts are liable to inflame or suppurate; by gradual extension, the contractility of the muscle, the tendons of which have been divided, is interrupted for a time, and restored by the stretching and motion of the parts when the foot is again used. “In all my cases,” adds Stromeyer, “of division of the tendo-Achilles, the use of the muscles of the calf has been completely restored. Dr. Weiss informs me that at Paris the use of the muscle of the calf is not always restored. This may probably depend on the immediate separation of the ends of the tendon, which does not prevent its healing, but hinders the restoration of the function of the part; it is also possible that, by the extension of the intervening substance, which, from immediate extension, is very thin, the cicatrix itself may be lacerated.” The views of Stromeyer are, I believe, on the whole correct. I am of opinion, however, that the

new substance will and does admit of sufficient extension to compensate for the greatest amount of shortening met with in any deformity ; for I have repeatedly, in cases of talipes equinus, found the new connecting medium full two inches in length within three or four weeks following the operation, especially in those cases where there is no resistance in the joint, and where the foot admits of being rapidly brought in its normal position. Again, how often is it that, in fracture of the patella, or in rupture of its ligament, the new and permanent uniting medium is full three inches in length, sometimes more, and sufficiently strong itself, were it not that the muscle, from its greatly increased length, loses its power of action. I was lately consulted by a gentleman who, six months previously, had ruptured his ligamentum patella. He was kept at rest, and the patella held well in position for six weeks ; at the end of that time he was allowed to use the limb. For the first few days he walked with comfort, feeling but little inconvenience ; by degrees, however, he experienced great weakness, and found his knee-cap, to use his own expression, rising, and getting high. No means were adopted to prevent it, and the uniting medium has become gradually elongated to the extent of two or three inches, through the constant extension kept up by the action of the rectus and crurus muscles ; the new substance is firm and strong, and the patient is enabled to walk with ease on level ground, but is totally incapable of extending the leg sufficiently to walk up a steep hill, or up and down stairs, without, in ascending, drawing it after him step by step, and in descending, placing it first on each step, and bringing its fellow down to it. I have not the slightest doubt that had the extended position been maintained for three or four months, until the new matter had become consolidated, and had degenerated, so to speak, into a permanent cicatrix, that no ill consequences would have followed. It is true, as a general rule, that the cicatrix after the cure is effected, measures but a few lines, oftentimes only a line, in the thickness, provided proper care has been taken during the treatment, which arises from the circumstance, that every new substance, after it has fulfilled the purpose for which it was generated, viz. the restorative process adopted by nature to remedy any wound or injury, loses its vascularity, except so far as is necessary for its individual vitality, contracts upon itself, and draws with it, if unrestrained, the part with which it is connected ; as in the painful distortions so frequently witnessed in burns on the neck and face. In the foot I have

found the permanent cicatrix full two inches in length (after the operation of talipes equinus;) and a worse distortion produced, viz. the talipes calcaneus valgus, where the foot was placed in position immediately after the operation, and kept for a long time in the flexed position; this position was not however, maintained, except during the exercise of volition. The elongation in congenital cases, and also in non-congenital cases, of young subjects, is undoubtedly effected eventually at the cost of the contractility of the muscle, but not primarily: this is a secondary result, for no uniting medium can by possibility possess the power of drawing down the muscle, any more than the newly formed granulations following a burn can do; the cicatrix, as it contracts, certainly does so, but after the foot is brought into position; and hence the linear cicatrix. The force of the contraction of a cicatrix is sufficiently evident in the instances of burns alluded to, not only to draw down and overcome one muscle, but even a set of muscles — as the extensors of the head and neck, or of the arm, and other parts.

I have had two opportunities of examining the condition of tendon that had been operated upon during life, after death; the one was a boy about seven or eight years of age, in whom the tendo-Achilles was divided for complete talipes equinus, the heel being elevated to its full extent: he was of weak, delicate, and unhealthy constitution, and the foot was brought into position three or four weeks after the operation; the uniting medium was at that time nearly two inches in length, soft, yielding, and exceedingly weak. It gradually, however, strengthened, contracted upon itself, and became as strong, to all appearance, as the original tendon; nor could any irregularity or thickening be detected. Twelve months after the operation he was attacked with scarlet fever, of which he died. His father informed me of it, and offered to allow an examination. On examining it externally, no trace of its having been divided could be detected; it possessed the same prominent uninterrupted outline as its fellow; the point of puncture could with difficulty be detected. On removing the skin and cellular tissue, there was no evidence of a wound having been inflicted, no adhesions, thickening, or swelling, and on laying open the sheath the tendon presented one uniform and natural appearance; so much so, that one was almost led to doubt the possibility of its having been divided. I then made a longitudinal section, but could discover no alteration with the naked eye, except a sort of globular appearance in one spot, but not sufficiently differing from the

tendon itself to make us positive. The other was a congenital case of talipes varus, in a child of eight months of age when operated upon, and who died from whooping-cough and head affection eight months after the operation. The tendo-Achilles, the anterior and posterior tibial tendons, had been divided. The same perfection existed here, and, at the examination, no trace of any kind could be detected, in appearance or by sense of touch : I was fortunate enough to obtain the tendon, which you can examine for yourselves. That the division and reunion of the tendon acts on the vital properties of the muscle, and, by diminishing its irritability, lessens its contractile power, is to me doubtful, and will not apply, as far as my observation goes, to any permanent contractions, for in these cases we have no evidence whatever of irritability of the muscle existing at all. In spasmodic contractions, however, where the exciting cause still exists, it may have that effect ; but of this I have seen no proof. If disconnecting the muscle and tendon, and allowing the former to contract upon itself, thus destroying altogether its power of control, be an evidence of this influence, well and good ; but in those cases of spasmodic contractions where the division of the muscle has been effected, and the limb more easily held in position, yet, as the newly formed substance gains strength, the same irritability and spasmodic tendency exists upon any attempts to exercise the voluntary power ; nor have I seen an exception to this. An old gentleman, seventy-two years of age, consulted me about a spasmodic contraction of his great toe, which, after walking a short distance, inconvenienced him so much, that he was willing to submit to any operation for relief. I first divided the long flexor in the sole of the foot, and for fourteen days he could walk without the contraction being produced, although he experienced the same sensation of contraction of the muscle. As soon as the new uniting medium was sufficiently strong, down went the toe as badly as ever. I then divided it beneath the first phalanx, which effectually prevented a return of it, but not in the slightest degree was he relieved from the sensation of spasm ; nor can I understand upon what principle the irritability of a muscle can be relieved by a division of its tendons, as the nervous supply is from above, not below.

The debility arising in the case of the medical man mentioned by Stromeyer, was caused, in my opinion, from too early use. The circumstance of the foot hanging like a loosely connected part, after imperfect union of the tendo-Achilles, arises in consequence of the balance of power

being destroyed between the flexors and extensors: the flexors being weakened from want of the opposing power necessarily exercised during the time the gastrocnemius retained its natural condition, the foot, of course, would not remain flexed except during the exercise of the will. It appears, therefore, that Delpech and Stromeyer are both correct with regard to the condition of the new substance, and it is only a question of time whether the tendon be examined within a few weeks, or after the cicatrix has become confirmed in its position.

Von Ammon (*De Physiologiâ Tenotomiæ*) gives the following account of the union of tendons: — “When a tendon is divided a slight degree of pain occurs, but no spasm of the part. In a short time a gap is produced by the contraction of the divided tendon, the principal part of the contraction taking place in the part of the tendon above the division.” This gap is soon filled up with blood, which, he says, chiefly flows from the upper end of the divided tendon. This blood soon coagulates, and in this process unites firmly with the surrounding parts, and more especially with the wounded surfaces of the tendon, the ends of the tendon presenting at this time an appearance as if they had been tied round with a thread. The next change consists in the effusion of coagulable lymph beneath the effused blood, from the surrounding tendon and adjacent parts; this lymph becoming soon marked with conical and thread-like streaks of a white colour, which extend from the two divided ends of the tendon, and seem to shade gradually into each other. This soft substance thus thrown out, instead of remaining as a pulpy semi-transparent mass, soon becomes connected into a structure which resembles, to a certain degree, the structure of tendon. This substance is not, however, true tendon in structure, although it exercises the same functions: on the surface and in smoothness it resembles tendon; but it differs from it in presenting, in its early stage, a substance of an udder colour, and of a more compact form, and afterwards presenting a more blue colour than real tendon. The motions of this new substance are more confined than those of real tendon, partly on account of its want of elasticity, and also from its adhesion to the surrounding parts. This new substance is formed in about fourteen days. It may not be uninteresting to lay before you the first case Delpech operated upon, on the 9th of May, 1816, which is related with so much simplicity, truth, and candour. A magistrate of Montpellier consulted Delpech about a congenital deformity in the foot of his son, a

boy of nine years of age. After a careful examination, Delpech, finding the resistance existed in the tendo-Achilles, and reasoning on the restorative process adopted by nature in case of rupture of that tendon, and of fracture of the patella, determined to make an attempt to cure the deformity by means of the division of the tendon, feeling satisfied that if the foot was brought into position, and maintained by suitable support, the patient would be in a much better condition, although he might not possess the power of using the muscle of the calf. The operation is thus detailed:—The patient was laid horizontally on his face, so as to exhibit the parts of the leg containing the tendo-Achilles. “We,” he says “introduced the blade of a knife completely before the tendon, and caused it to pass entirely through from the internal to the external side of the leg, so as to divide the skin on both sides an inch in length, and with it the cellular tissue in front of the tendon. This instrument was then withdrawn, and replaced by a knife the end of which was convex, the direction in which it acted being from the front to the back of the tendon (our present mode of dividing it), which was thus divided transversely entirely through, without touching the skin that covered it. This portion of the operation was but slightly painful; and as soon as it was accomplished, we hastened to flex the foot, and found, with the greatest satisfaction, that no obstacle existed to prevent the axis of the foot from forming a right angle with the axis of the leg. Satisfied with this experiment, which convinced us that the first difficulty was overcome, we proceeded to apply the apparatus which we had prepared to fix the foot in the position in which it was held by the tendo-Achilles before the operation. With this view, the instrument was assisted by a linen bandage like a sling, which, taking its support from the ascending side-pieces, constantly pushed the heel forward. In this condition the two ends of the tendon appeared perfectly opposite, and in immediate contact, as well as could be perceived through the integuments. In order to keep the ends in position, to preserve them from the slightest motion, and to prevent any swelling of the cellular tissue surrounding them, as well as to keep down inflammation, slips of adhesive plaster, (which did not, however, at all tend to draw together the lips of the two small wounds) were used to fasten down pieces of lint on the point of section, causing a slight pressure upon it. The limb was afterwards placed upon a pillow, with the inner side upwards, the leg and thigh being bent. Thus each part being fixed in the posi-

tion which it should occupy, the state of the case might any moment be examined without disturbing the apparatus. The patient was then put on a severe regimen, and allowed nothing but rice-pudding and veal-broth. The pain following the operation was very slight, and the patient would have slept well had not the excessive but very natural anxiety of Delpech caused him to order an attendant to keep her hand constantly on the limb to prevent any hazardous movement. On the tenth day a soft swelling was observed, which, on being pressed, discharged a certain quantity of matter from the wounds which had not united. This process enabled him to see that the two ends of the divided tendon were not separated from each other. On the twelfth day portions of sloughed tendon and matter came away, after which it proceeded favourably. Twenty days after the operation no interval could be perceived at the point of section, but a sort of narrowing or neck, which, he says, indicated that neither the breadth nor thickness had been preserved. On examining it on the twenty-eighth day, the narrow part of the tendon was found to occupy only a few lines in length, and to be influenced by the movement of the foot. Extension was now commenced, and for two days little pain was experienced, nor did the heel come down. This, he says, involved consequences so serious, as to lead them to seek diligently for the cause of such a phenomenon; when they discovered that the patient had loosened his straps (a circumstance, gentlemen, of no uncommon occurrence). Greater care was then taken, and the stretching kept up; upon an increase of which pain was felt, but it did not interfere either with his appetite or rest. As the flexion proceeded, the foot was found to evert; and as the instrument was not capable of preventing this, splints were applied on both sides, so as to prevent any lateral deviation. Extension was re-applied, and from the pain which followed it was evident the machine was acting efficiently. The foot was greatly improved, and on examining the tendon it was clear that the two ends of the tendon were separated nearly an inch and a half. In a few days more the foot was bent to a right angle; but he adds, the use of the instrument was continued much longer, in order to keep the parts in position during the period required by nature to give to the intermediate substance all the solidity requisite. At the end of a month it presented an extension of two inches in length, and an insurmountable resistance prevented the flexion of the foot beyond a right angle. To enable the patient to walk, a kind of boot was

contrived, with springs attached, suitable for propelling the foot forward and keeping it in position. The patient used his foot with excessive pleasure, and with all the confidence desirable. A temporary illness followed, but he says he now enjoys perfect health, and with the aid of a convenient apparatus, which we intend him to wear for several years, excites, by the ease and rapidity of his movements, the astonishment and admiration of all those who knew his former distressing state of deformity.

I have, gentlemen, thought it right to give you this case thus in detail, as it is full of interest, from being the first practical information we possess on the subject.* It teaches us, besides, the reward of perseverance. Delpech had no ordinary difficulties to contend with, and yet he allowed none of those obstacles to prevent him from carrying out his views; on the contrary, he met with difficulties at every turn, but met them boldly, and has shown the world that deformity was no longer to continue invulnerable, but that it must succumb to the science of surgery; and in thus patiently, ingeniously, and triumphantly overcoming every impediment, he has laid the foundation of the new and successful treatment which we are at this moment carrying out. Delpech seems to have grasped the whole system, for he not only got the foot into position, but directed his attention most extraordinarily to maintain it so, — proving how correct were his physiological views of the new uniting medium; — and his ordering a boot with the support attached, for his patient, is a circumstance of great importance: thus leaving nothing undone, nor to which we have as yet added in its principle.

To Stromeyer, however, belongs the exclusive credit of re-introducing it; for, strange as it may appear, none of Delpech's countrymen took it up; neither, as you are well aware, did any one in this country. Dr. Stromeyer, of Hanover, at length directed his attention to the subject, and extended it to deformities in general, with success. It is now scarcely more than seven years, since my late colleague, Dr. Little, having witnessed the treatment of Stromeyer, introduced it into this country; having also, on his way back from Hanover, visited Berlin, where Professor Dieffenbach operated on an immense number of cases of every variety, dividing every muscle that appeared contracted, and has applied the operation also to the reduction of dislocation. He has only mentioned the division of the posterior tibial tendon in two cases, whereas we find it necessary, in almost every case of talipes varus, from its

extensive insertion, and the great power it possesses of rotating the foot inwards, in consequence of the leverage it possesses from passing under the inner malleolus. It was, however, never attempted, that I am aware of, in children under twelve months old, until I invented a stilette and canula, with the blunt-pointed knife, which enabled me to divide the muscle in infants without risk of puncturing the posterior tibial artery. The complete division of the artery is not, from our experience, of any moment; it has been frequently done, and must with the greatest precaution occasionally occur. Not so, however, a puncture of the artery, two cases of which have occurred; in both false aneurism was the result, and in both was it necessary to cut down upon and tie the vessel. The first was a puncture of the posterior tibial, the other of the internal plantar artery, in a boy eleven years of age. Since the opening of the Institution more than two thousand cases, embracing every variety and complication of deformity, have presented themselves; and, I say it with pride, our success has equalled our most sanguine expectations.

The term *special* has been applied to the peculiar objects of this and other institutions devoted to one purpose; if it conveyed an impression only of that kind, I should not have noticed it; but this term too often leads to the conclusion that those connected with such institutions confine themselves to the study of one department of the science; but, gentlemen, because we, as surgeons, choose to adopt the improvements made in the profession of which we are members, are we to be designated by the opprobrious term of *specialists*, and thus, by implication, to be excluded from surgery in general? If such were the consequence, much as I might deplore the ignorance or bigotry which caused it, I would not belong to this Institution another hour. I give place to none in my anxiety to follow surgery as a science, or to uphold it in the position it justly takes in the rank of the learned professions, and however inferior I may be to my professional brethren in ability, I yield to none in love for the profession, or in anxiety to preserve it inviolate as it ought to be; "an honourable, an intellectual, a noble occupation," my most strenuous efforts will ever be directed to cultivate and cherish the good opinion of its members. The objects of this charity call into exercise our anatomical, physiological, and surgical knowledge; they embrace the muscular, the osseous, and ligamentous tissues of the whole body, as well as the skin itself; the cerebrum and spinal marrow but too frequently are causes, and, with the excep-

tion of congenital cases, are very general causes, of the deformities which present themselves; and many cases are occasioned by diseases of the bones and joints, and parts surrounding them; if, then, the term special can be applied, I can only say it is a speciality embracing the study of the whole body. This branch of surgery calls into exercise, as I have just observed, our anatomical, physiological, and surgical knowledge; and is not the mechanical treatment in accordance with the treatment of dislocations and fractures? I believe the knowledge of the treatment of deformities scientifically will be the means of improving mechanical surgery in general. A case was related a few weeks since, where the tendo-Achilles was divided to enable the surgeon to reduce a dislocated ancle. Again, let us go to the causes of congenital deformities; some are at present inclined to attribute them to a mental impression, generally a sudden one received by the mother during pregnancy: but the evidence is far from being conclusive; for it oftentimes happens that the mother can assign no cause; in other cases the deformity appears hereditary, and I know of one instance where a family of eight children had a double varus, and the parents refused to have anything done, for fear of destroying their uniformity.

In non-congenital cases, teething, worms, and irritation of the spinal chord, are frequent causes. Certain occupations, such as much standing, or carrying heavy loads; position also may be regarded as a cause, especially in lateral curvature of the spine, knocked knees, &c., and diseases of the bones themselves, in antero-posterior curvature; muscular action in rachitis, as the immediate and insufficient nourishment, or badly assimilated food, as the remote cause, injuries also of various kinds, to the spine, bones, &c.; but occasionally we are at a loss to discover any cause, the deformity coming on insensibly, whilst the patient is apparently in perfect health. Again, deformities themselves vary as much as their causes; the same deformity in both feet will rarely yield to treatment as rapidly in the one foot as in the other; and even in infants one case will present comparative little difficulty, whilst another precisely analogous in appearance, will require the greatest caution and perseverance, and sometimes a long time to effect the cure. Thus, gentlemen, you will perceive that there is abundance of mental occupation in the treatment of deformities, but most especially in the investigation of their causes; for in my opinion, the non-congenital are by far the most painful and severe in their consequences, involving but too fre-

quently paralysis of the moving powers themselves. These cases, if attended to at their commencement, might certainly be relieved and prevented, but it often unfortunately happens that there is little interference with the general health ; the deformity, as in the foot, for instance, coming on insiduously, no attention is paid to the circumstance ; a weakness, as it is termed, of the ankle is felt, and the foot deviates occasionally from its natural position ; the fears of the parents are then excited, and they consult their medical attendant, who consoles them with the mistaken notion, that the " child will grow out of it ; " and thus the foundation is laid for a permanent deformity, or at all events a permanent weakness, of one or both limbs, which may involve their being disabled for life.

Gentlemen, it is our privilege to be placed in the position of administering relief to those who have hitherto regarded relief as hopeless ; and if there be one encouragement greater than another, it is the inexpressible happiness of witnessing the success attending our efforts, on the one hand, and the gratitude evinced by those emancipated, if I may so express myself, from perpetual bondage, on the other. This applies with peculiar force to the deformed poor, who have been doomed to drag out a miserable existence in the workhouse, shut out (to use the words of the poet) " from the common air and common use of their own limbs." We have had, since the opening of the Institution, patients sent from workhouses whose deformities arose from injuries to the spine, totally unable to move without crutches, but who have walked out of the house, and been enabled to resume their occupation.

It is an unspeakable gratification to be the instrument of dispensing these blessings. But, gentlemen, we have a still more exalted object in view ; viz. to extend by every means in our power the knowledge of this branch of surgery to our professional brethren, and thus to make relief universal throughout the empire.

LECTURE II.

ON TALIPES EQUINUS.

THE plan I propose to adopt in these lectures is this :— I shall first direct attention to the deformities of the feet,

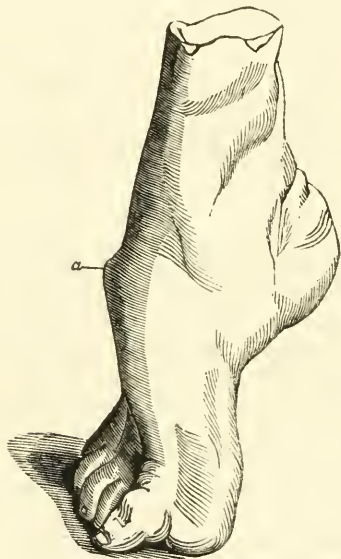
the treatment of these being the ground-work of the treatment of deformities in general; having been in fact, the origin of the new method of treatment which has now extended itself to every variety of deformity of the body. After the deformities of the feet, I shall consider in their order those of the knee, hip, spine, neck, and upper extremity. I intend also to illustrate the several operations I discuss practically, when I am enabled to do so, at the termination of each lecture.

The most simple form of distortion is *talipes equinus* or *horse-foot*, so called from its anatomy corresponding to the natural anatomical formation of the foot of the horse. It consists in complete elevation of the heel, unaccompanied by lateral distortion; the concavity of the arch of the foot being increased; the toes *extended in position*, though occasionally *contracted in form*, in consequence of the extreme flexion to which they are subjected; and the metatarsal bones frequently diverging from each other (vide Fig. 3,) by which the anterior part of the foot acquires an appearance of increased width; which, indeed it virtually possesses. The patient in walking rests entirely on the heads of the metatarsal bones; the os calcis is almost perpendicular, from the contraction of the gastrocnemius; the astragalus lies obliquely in the articulation, presenting its heads forwards and downwards, and frequently projecting, in consequence of the separation of its superior surface from the scaphoid bone, and the elongation of the ligament that lies between them. The cuneiform and metatarsal bones change their position, so as to correspond with the direction of the foot, whilst the phalanges are extended, and appear set on at right angles to the metatarsal bones; from the pressure occasioned by the weight of the body, the ligaments on the dorsum of the foot are slightly stretched, whilst those in the sole become more or less contracted, according to the age of the patient, and the duration of the deformity.

As a general rule, the muscles, with the exception of the gastrocnemius, are in a state of extension on the anterior surface, and of contraction on the posterior, although not permanently so. This description in its full extent, applies only to a perfect case of *talipes equinus*, such as may be seen in Fig. 1; but the same features of course exist more or less in every modification of this species of deformity; their degree depending on the severity as well as on the variety of the case, from the simple contraction at right angles, to the utmost possible elevation of the os calcis.

I have never met with pure *talipes equinus congenital*. The causes of the non-congenital deformity are numerous. The irritation of teething, worms, any derangement of the nervous system, wounds in the calf, rheumatism, scrofulous disease in the ankle-joint, or in the substance or tendon of the gastrocnemius. Not unfrequently, however, this deformity arises spontaneously, the patient experiencing no pain or inconvenience beyond the inability to bend the foot or ankle-joint in the act of walking, and retaining at the

Fig. 1.



Talipes equinus, the consequence of scrofulous disease of the leg ; *a* is a projection formed by the head of the astragalus separated from the os scaphoides.

same time power over all the muscles. When talipes equinus arises from *dentition*, it is often combined with contraction, and partial paralysis, of the upper corresponding extremity ; occasionally, however, it is unaccompanied by any other deviation. Frequently in such cases there will be found paralysis of the anterior tibial muscle ; so that the contraction would appear in these instances to arise from the balance of power being destroyed, and the gastrocnemius being thereby allowed to contract upon itself. Frequently, we find perfect paralysis to be connected with a fit, or a great cerebral disturbance, which subsiding gra-

dually, or more quickly, leaves the flexors of the foot paralysed. I have had opportunities of witnessing this con-

Fig. 2.



The cast of the foot represented in Fig. 1, after treatment, showing the removal of the contraction of the toes by the restoration of the foot to its natural state.

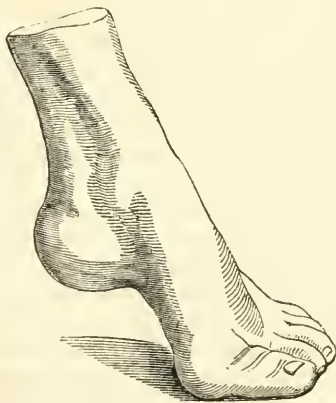
traction from its very origin. I was consulted by the parents of a child, 18 months old, that had contracted a limp which occasioned it frequently to fall; upon directing the child to be led across the room, I observed that in the act of progression the right heel was elevated the moment the left foot was carried forwards beyond the perpendicular line of the body, and that the toes diverged from each other when pressed upon it by the weight of the trunk. On carefully examining the foot, I found partial loss of power in the anterior tibial muscle, and incipient contraction of the gastrocnemius, so that although I could flex the foot by using considerable force, yet upon withdrawing my hand it recontracted immediately. Upon inquiry I found that the child was suffering from the irritation of teething, and also from the thread-worm; the gums were freely lanced, scammony and calomel administered periodically, and the child improved in health. Still, however, the deformity remained; a tin splint was applied behind the leg and foot, and coming at right angles under the latter; embrocations were used, and flannel bandages were applied to the entire limb; but even these means failed in restoring the natural condition of the muscles, and the tendency to contraction still remained. I then ordered one of Scarpa's shoes, which was worn for six months with beneficial effect. The child was then sent to the sea-side, and for a time appeared perfectly well; but the same tendency to retraction recurring, I proposed division of the tendo-Achilles, and the opera-

tion was done ; since which time the foot has remained perfectly in position, and the child possesses free voluntary motion. This case is important, inasmuch as it would appear on consideration of the circumstances attending it, that the contraction although so *slight*, was *permanent* ; as we find that the increased length given by the operation has allowed the anterior tibial to exercise its full function, and there has been no disposition to any return of the affection.

The irritation following a *puncture, or other wound*, sometimes sets up diseased action in the muscle of the calf, or in the nerves supplying that muscle, which resolves itself into gradual contraction of the gastrocnemius, although unattended with paralysis of the flexors of the foot, or even by any loss of power, at least so far as can be discovered. This does not occur at the time of the infliction of the wound, or during the subsequent healing process, but after the patient has to all appearance recovered from the effects of the injury ; his attention being drawn to the circumstance by his inability to flex the foot completely ; and the infirmity, if unattended to, gradually increases until the os calcis is elevated to its extreme point ; the *inherent* motion of the ankle-joint remaining unimpaired.

Rheumatism occasions this deformity, as well as numerous others ; in fact, there is not a joint in the body which escapes the influence of this disease. When talipes equinus arises

Fig. 3.



Talipes equinus from paralysis during childhood (patient, æt. 15) : illustrating the great increase of the arch of the foot and divergence of the metatarsal bones.

from a rheumatic affection, it generally commences either during, or immediately after, the active stage of the disease ;

Fig. 4.



The foot represented in Fig. 3, after treatment : showing the restoration of the arch of the foot by the removal of the contraction of the gastrocnemius simply.

and appears to arise from the contracted position which is occasioned by the painful state of the whole of the textures belonging to the joint and surrounding it, and which causes the muscles to be kept in constant exertion to prevent the slightest motion ; the extensors preponderating, gradually extend the foot, so that when the patient is allowed to walk, he finds his heel elevated from the ground, or else finds an inability to flex the foot. This is perhaps the most serious form that can be met with, inasmuch as the synovial membranes and ligaments of the joint become thickened, and offer an obstinate resistance to the restoration of the foot to its natural position after division of the tendon, and even after the foot is brought into position, unless great perseverance be used, the motion of the joint will not be restored. We are thus lead to suppose that there has been an adhesive thickening and alteration in the structure of the whole joint, and that the contraction exists not in the muscle, or its dependent nerves, but that it has arisen purely from the position adopted instinctively by the patient to relieve himself from pain during the attack. This position is generally one in which the more powerful muscles easily obtain an ascendancy over their weaker antagonists, and although the *instinctive shrinking* from pain is undoubtedly communicated to these muscles by the nerves which supply them, still the *actual contraction* must be produced by a constant effort of

the will alone to keep the limb and joint motionless; and therefore it is evident that the deformity thus occasioned is perfectly unconnected with the nerves and their centres, and exists independently of them when the disease has subsided, and the tenderness of the joint has disappeared. After the restoration of the foot to its natural position, the patient acquires all the power of voluntary motion, and the cure thus becomes perfected. You will not, however, meet with any deformity which will give you more anxiety, or require greater care, than the last; because in the others which have been mentioned, the joint itself offers no resistance, and is not the original cause of the deformity, so that having divided the contracted muscle or muscles, the cause and effect being removed, you will find the foot readily resume its position. Not so with a *rheumatic* deformity.

The next cause I shall mention is that of *scrofulous disease or ulcers* about the calf, tendon, or joint, but more especially ulcers about the calf or tendon. I had a patient under my care who, at two years of age, was attacked with scrofulous inflammation of the leg and arm, which continued until the age of six, a period of four years; in the arm the joint became diseased, and the affection terminated in complete ankylosis of the elbow-joint at right angles. The patient, however, possessed a very useful limb, and is enabled to follow his avocations with comparative ease. In the leg the disease did not permanently affect the joint beyond the irritation consequent on its close vicinity, which irritation, after the healing of the wound, subsided, leaving no trace behind it: the calf and tendon, however, were covered with cicatrices, which adhered both to the muscle above and to the tendon below, and which, being influenced by every action of the muscle and tendon, gradually (as cicatrization became perfected), and almost insensibly, drew up the heel until it reached its highest possible elevation — the foot forming a perfectly straight line with the leg without the slightest deviation on either side, the patient walking on the very centre of the heads of the metatarsal bones (vide Fig. 1, in which this case is represented); and a more complete specimen of talipes equinus could not be met with. On examining the foot, it was found that by the use of great force the smallest possible amount of motion could be discovered, sufficient to lead to the hope rather than to the assurance that the joint itself was uninjured. I proposed the operation, at the same time stating my opinion that the future result might not be altogether favourable: the patient submitted. On passing the knife behind the

tendon, which was done with some difficulty, I found that the tendon itself was completely imbedded in cicatrix, and that from the deeper-seated fibres to the upper surface the whole formed one mass: on attempting to cut the tendon in the usual manner, not the slightest impression could be made, tendon and cicatrix together yielding like a piece of Indian-rubber. I was therefore compelled to cut into it by the smallest repeated cuts, and, after great difficulty, I separated the whole to the very cuticle (for the skin itself was in a state of adhesion). In three or four days, extension by means of Stromeyer's foot-board was commenced, and gradually increased for six weeks, at the end of which time the foot was brought to a right angle with the leg (vide Fig. 2, taken from the cast)—not, however, without much difficulty and attention, for although every thing had been divided which admitted of division, yet the ends were still kept in contact by the remaining portion of the cicatrix, which was firmly attached to the deep fascia and muscles, and extended the whole length of the tendon. The patient has, however, no paralysis of the anterior tibial muscles, or extensors of the toes, and now possesses a limited degree of motion of the foot; there is no tendency to re-contraction, and the patient walks in a common boot, without any support.

There is another and more serious form of disease arising from scrofulous affection of the joint itself, and which admits of no remedy after the subsidence of the diseased action, perfect ankylosis then resulting. But in this variety of the deformity, the position of the foot may be restored by the careful application of support (that is by means of splints) during the diseased action, or before the adhesions have assumed their permanent osseous condition; though in these cases, of course, permanent voluntary motion of the joint is out of the question, for in whatever position the restorative process becomes matured, in that position must the foot remain. This modified system of cure, however, can apply only to young subjects, as disease affecting the bones and joints of adults very seldom admits of cure, except by means of the amputating-knife.

The last cause of this deformity which I have to allude to is at present entirely hidden from our sight, and leaves us to speculation or theory. Our knowledge of the functions of the nervous system is limited, and this state of our ignorance disqualifies us from giving any satisfactory explanation as well as of those deformities which arise without apparent interruption to the general health, as of those

formidable and fatal affections, tetanus and hydrophobia. On none of these affections has physiology or pathology yet thrown any light, although both have been the study of many able members of our profession. We cannot, therefore, reasonably hope, whilst the cause of the more palpable and striking, and serious nervous disorders, still remains involved in mystery, that the less remarkable and the milder derangements which sympathetically occasion paralytic deformities should be easily traced and comprehended. In the cases I now allude to, it will be found, on inquiry being made into the cause, that the parents or friends of the patient will reply, "that the child was put to bed in perfect health, and slept well, but that upon taking it up in the morning it was found to have lost the use of one or both extremities; or that the leg was observed to be motionless; upon recovery from which state a weakness remained in the foot which terminated in the deformity." A case of this kind occurred in my practice three years ago, in which the heel was elevated about three inches from the ground, and in which perfect paralysis existed, and still exists, in the anterior tibial muscle, although the patient, during childhood, was not remembered to have suffered any illness. That some diseased action has gone on at one time unobserved cannot be doubted, nor can there be a question that this diseased action was connected with the brain or spinal chord; yet, strange to say, the mischief in this case proceeded to the serious extent mentioned above, and resulted in permanent paralysis, without affecting the health of the child, who would unquestionably, by crying, or otherwise, have at once announced any pain or inconvenience that it might have felt. This is a circumstance occasioning much surprise and curiosity. We have several cases of this kind on the books of the Charity, which all leave the occurrence of these sudden attacks of the nervous system a fact yet to be accounted for. There is another species of spontaneous contraction which I have met with in the adult, without, however, the addition of paralysis. The patient will tell you that he or she has had no illness, but that they found their heel or heels, for it sometimes occurs in both feet, gradually become elevated from the ground, causing severe pain in walking, and at length preventing them from pursuing their daily avocations. I saw a case of this kind, a short time since, in St. Bartholomew's Hospital, through the kindness of Mr. Lawrence, in whom both feet were affected, the heels being drawn up to their full extent, or nearly so. The patient stated that the affection had come on gradually,

and that he could assign no cause ; there was no paralysis of the muscles in front of the leg, and after the feet were brought into position he could flex them and extend them at will. We have had two or three cases of the kind among the out-patients, in which no trace of any cause could be imagined or discovered. The patients had been subjected to no illness, had felt no pain, had not been deprived of the power of following their usual employments ; there was no paralysis, nor, as far as could be discovered, any loss of power ; and yet, by insensible degrees, the os calcis was drawn up — the first notice the patient received being a difficulty in walking, and an inability to bend his foot, terminating in complete elevation of the heel. What can be the morbid condition which induces such a malady ? The probability is that the origin of it lies in the spinal chord, which exercises a sort of perpetual irritation throughout the whole muscular system. This is not a perpetually active irritation, but rather a universal pervading stimulus ; the former would inevitably result in spasmodic contraction of the muscles ; the latter influence only keeps them in readiness and health to obey the dictates of the will. This general influence of the spinal chord, however, may occasionally be, and in these instances is, limited to one muscle ; for in the cases alluded to the foot was neither inverted nor everted, but held in a straight extended position, and after the division of the tendon the restoration of the foot to its natural position followed, without its having exhibited any tendency to deviation on either side during the time of treatment.

In all cases, from whatever cause they originate, more or less atrophy of the entire limb will be found, according to the length of time the deformity has existed ; and even in incipient cases, in which, before the contraction is confirmed, and previous to paralysis of the flexor or flexors, you may, by appropriate remedial measures, have removed the exciting cause ; yet even in these cases I have always found the affected limb smaller than natural, as well as smaller than its fellow ; for the perfect limb may be said to be larger than natural in consequence of being compelled to do double duty, and the muscles thereby becoming more strongly developed. The weakening influence of the contraction in the affected foot at an early period becomes permanent ; the patient possessing one strong and useful limb, avoids, as much as possible, the use of the infirm member.

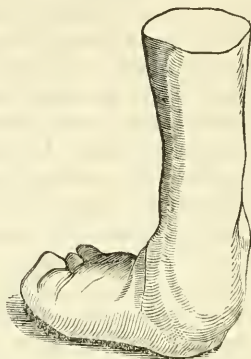
In those cases where paralysis of one or more muscles exists, of course there can be no chance of re-development

of the member; the patient must then rest satisfied with the free motion of the joint and artificial support, as at present we are aware of no cure for paralysis; whereas in those cases where contraction is found without co-existing paralysis, whatever the age of the patient, we find that after the removal of the contraction, and of all impediments to the motions of the joints, the limb will recover to a great extent its natural size by a re-development of the muscles from exercise. I have observed this effect to occur in two cases, each at the age of 38 years. In both the contraction had taken place in infancy, and every mechanical and other means had been resorted to without success. In one the heel was elevated three inches above the ground, in the other not more than half an inch; the anterior tibial muscle in both retained its power of motion after the operation and flexion of the foot, and both patients were enabled to use the foot with perfect ease and comfort without assistance from artificial support; the limbs, too, increased in size and firmness, and the pain and lameness were entirely removed.

The cases I have described hitherto have been examples of perfect talipes equinus, in which the foot does not deviate to either side; but it frequently happens that in consequence of the loss of power, or paralysis of the flexors of the foot, a weakness of the lateral ligaments ensues, from constant stretching occasioned by the weight of the body in walking; and great pain is frequently experienced from treading on any uneven surface, such as a pebble, or rather inequality; so much so that I have known a patient, after having made one unfortunate step of this kind, unable to walk for the remainder of the day — the contact of the foot with the ground occasioning a sensation as if the ankle had been dislocated. This stretching gradually increases the length of the passive attachments of the joint, until the patients walk on the under and outer surface of the fifth metatarsal bone. The variety of talipes equinus thus produced is called *talipes equinus varus*; and the foot occasionally becomes so completely inverted that the patient walks on the dorsum of the metatarsus. Of course the ligaments on the dorsum are also greatly stretched: but the deformity, although so frightful in appearance, is generally very manageable; though the under margin of the foot becomes closely approximated to the internal malleolus, yet will it generally be brought to yield, and to assume its natural position, by the division of the tendo-Achilles alone. It is not, as you will more clearly perceive hereafter, the

amount of deformity, so much as its cause and nature, which occasions difficulty in the treatment.

Fig. 5.



Cast of a patient, 18 years of age, in whom the foot at first presented the appearance of talipes equinus, but from the cause mentioned, the sole is directed upwards, the dorsum downwards.

A contraction of the gastrocnemius, if it is impossible to flex the foot beyond a right angle, I should consider as incomplete talipes equinus, and you will find this species of the deformity vary from that point to the extreme form which I have before described in complete talipes equinus: even this modification, namely, a contraction of the gastrocnemius, will occasion the patient great inconvenience and pain, as in every step the weight of the body is thrown, when the other is carried forward, on the extremity of the metatarsal bones, and frequently the foot will swerve to either side, if on any but a perfectly flat surface. The lateral ligaments in these instances are elongated, and the foot if suspended above the ground, will appear as if its attachments were separated, when the will is not in active exercise; that is, when the muscles are in a state of repose. In almost all cases, and in every case without exception where paralysis exists, the natural temperature of the limb is reduced, and it becomes unable to resist the effect of changes of temperature. The limb appears enervated, which arises, I have no doubt, in a great measure from its passive condition, as well as from a weakened state of the nerves themselves, both of the skin and of the moving powers. From my observation I believe that the relative positions and size of the astragalus and the joint retain their normal condition; although I am aware that a differ-

ent opinion has been entertained, for in no case that has yet appeared have we failed to restore the position of the foot.

In adult cases, that have arisen during infancy, in which the patient has been compelled to use the limb daily in obtaining his livelihood, there is in all probability a thickening of the synovial membrane and ligaments, and diminished size and capacity, from a continuance in one position; the synovial secretion also must be less abundantly generated, not having been required to lubricate the joint, inasmuch as there has been no motion; hence the grating often felt after the foot has been placed in its normal position. Both of these circumstances would act as impediments to the return of the astragalus back into the articular cavity; but this difficulty does not constitute an alteration in the relative size of the astragalus and its articular cavity. The cavity of articulation is so beautifully adapted to its use, that in the healthy and natural state but little room is left beyond that which is actually necessary for the free motion of the joint: were it not so, dislocation would be a most frequent occurrence, whereas this accident is impossible without fracture of the fibula.

Treatment. — In every case where the contraction evidently and positively exists, I should adopt and recommend section of the tendo-Achilles; an operation so simple, so comparatively devoid of pain, and so delicate, that it can scarcely be called one; no risk is incurred beyond that appertaining to the slightest wound, and so morally and practical certain are its effects, that I have no chances of injury, no contingent evils, to lay before you for investigation. Here we have divided some hundreds of tendo-Achilles, in every variety of deformity, and as yet we have experienced no unfavourable result; therefore, as this tendon is the great cause of resistance, whenever you find it contracted, I would advise division.* The operation is thus performed: — Let the patient be placed horizontally on his face: let an assistant grasp the leg by placing one hand under it, and the other on the anterior part of the sole of the foot, holding it firmly; by these means he will obtain entire control over it: let him keep the tendon upon the stretch by endeavouring to flex the foot: you then feel the outline of the tendon, introduce a straight narrow sharp-pointed knife through the integument, and beneath the tendon, having its flat side in

* This operation of dividing the tendon has been long practised by veterinary surgeons.

contact with the under surface of the tendon. After you have passed it from one side to the other (without, however, puncturing the skin on the opposite side), turn the sharp edge of the knife towards the tendon, and by gently depressing and raising the handle alternately, you will divide the tendon transversely from the internal to the external surface, taking care not to lacerate or penetrate the skin beyond the point of puncture. Use no violence or sudden effort; let your incision be made with firmness, but quietly and with care; for in my opinion the professional man who values his own conscience and the welfare of his patient will never, for the sake of a few seconds of time, or for the vanity of making "an impression," neglect the ordinary precautions which experience teaches us are necessary even in the slightest operation which the hand of the surgeon is called on to perform. After the division (which is merely followed by two or three drops of blood) has been effected, you will place a piece of lint over the puncture, and keep it down by adhesive plaster; then apply carefully, and without any undue pressure, a bandage of flannel from the toes to the calf, supporting the foot by a padded straight splint. Let the patient be placed on a bed or couch, either in a horizontal or sitting posture, with the leg supported on a slightly raised pillow, and the knees flexed, taking care that the temperature of the limb is kept up by sufficient covering; for I need not inform you that if the temperature is below the natural standard, the restorative process cannot go on. I have known a case where, from the fear of inflammation, cold lotions were applied after the division of the tendon; the consequence was inflammation and supuration. You must be guided by the sense of touch as to what quantity of covering is required, and if one blanket is not sufficient let the limb be enveloped in two or more. Do not interfere with the diet of your patient, or in any way control him except to require "rest." At the end of three or four days you will find by these means that the two divided ends have united, and that the orifice of the puncture is healed; you will then carefully bandage the limb, and place it (in the same position in which it has remained both before and since the operation,) in the instrument for the extension of the foot.* If the contraction is slight, the patient young, and there is great mobility in the joint, you must be slow and cautious; for by hurrying it, the new uniting medium becomes too rapidly elongated, and great and con-

* Either Stromeyer's foot-board, or Scarpa's shoe.

tinued weakness is the result. In the case alluded to in my former lecture, the patient not only experienced great weakness, but a much worse deformity was produced than had before existed, inasmuch as the heel was at first tightly held by the contracted muscle, and the little patient could walk with firmness, whereas afterwards, from the uniting medium having been too much elongated, and from paralysis of the anterior tibial, the foot became as it were comparatively unattached, and yielded to such an extent that she now walks almost on the internal malleolus. The attempt, therefore, in weakly subjects, to place the foot in position immediately or shortly after the operation, by hastily proceeding to extension, as has been done by some, is a mode of treatment unscientific, and entirely destructive of the principles upon which the operation is founded. For its objects are two-fold : first, to overcome the resistance, and secondly, to preserve entire the integrity of the divided muscle, and thus to render it useful after the foot is restored to its position. You will, therefore, proceed with caution. In adult cases of long standing, however, you will not run this risk of the great elongation, as there will be found other resistance besides that of the contracted muscle alone. Here you will also have to contend against more or less pain, and to proceed very slowly, not from fear of too rapid a progress, but from the resistance in the joint, and the tenderness experienced by the patient, which is occasionally most acute, on every increase of the flexion ; and in cases arising from rheumatism, from scrofulous inflammation, and from cicatrix, the progress of the extension will require all the patience and perseverance you can command. The pain is occasioned by the return of the astragalus into the articular cavity, and is complained of principally at the front of the joint.

You will occasionally find, as the foot becomes flexed, that it will deviate either to one or the other side ; most frequently it will *evert*, forming a sort of talipes valgus ; and upon examining the tendons, the peroneii will be found contracted. If, however, it should *invert*, the posterior tibial will be the most probable cause. In either case division of the tendon must be resorted to, or the patient will be thrown either on the internal or external side of the foot, according to the state of the respective muscles. You will not be enabled at all times to discover this tendency previous to the division of the tendo-Achilles. Occasionally, however, you will find these tendons, viz., of the peroneii and the posterior tibial, tense in a simple talipes equinus, upon a forcible attempt to flex the foot. If this

tension continues after keeping up the forced extension for some minutes, you may be nearly sure that the tendon is contracted ; and I would advise division at the same time that the Achilles tendon is divided. It is seldom requisite to divide either the plantar fascia or the flexors of the toes, although both appear sufficiently tense and contracted previous to any operation. You will find that the arch of the foot will come down when the foot is flexed, and that the toes will assume their natural position — at least as a general rule. Should they not do so, the division of either, or of both of the tendons, may be afterwards effected ; the method of which operation I shall describe in detail, when I come to consider those deformities in which they most frequently require division. After the foot is flexed you may allow the patient to use it ; and that he may do so with comfort and safety, we must adopt the same means used by Delpech, viz., a boot and support. The foot will thus be maintained in position, at the same time that the patient is enabled to take exercise. The support will require a step-joint at the ankle to prevent extension beyond a right angle, until all trace of contraction and tendency to any recurrence of it shall have disappeared.

LECTURE III.

DEFORMITIES OF FOOT.

TALIPES VARUS CONGENITUS.

IN my last lecture I was engaged in pointing out the characters of talipes equinus, and showed that the deformity consisted essentially in contraction of the gastrocnemius muscle ; that it arose from local as well as from general causes, and that in the latter case paralysis would be found very frequently co-existing ; that in the local form, although paralysis of the flexors might not be present, yet that the resistance to the reposition of the foot was more obstinate, and the restoration of the extremity to its natural state more tedious, difficult, and painful ; that occasionally, during the progress of flexion, the foot might deviate to one

or the other side from a contraction of the peronei, or of the anterior or posterior tibial tendons, which contraction appears to be the result of habitual position, rather than of any disturbance in the nerves supplying the muscles.*

I stated that the temperature of the entire limb during the treatment is occasionally much reduced, so that it becomes very necessary to pay attention to this, as, by neglecting the temperature, comparatively slight pressure will often produce a slough, and then a wound tedious and troublesome to heal, and during the open state of which it will be necessary to suspend the treatment. You can, however, maintain the foot in the position to which it has been brought, by the continued application of a splint well padded; although you cannot advance, you may at all events prevent any relapse. As soon as the wound is healed, you will, of course, recommence extension. In cases where I have had to encounter these sloughs, I have found the best method of treatment to be, to support the foot entirely by means of strapping: you thus prevent the weakened capillaries from becoming over distended; and if the vitality is not completely gone, the parts will recover itself. And even should the vitality be destroyed, the threatened slough will frequently dry up, and terminate without any open wound. An instance illustrating this occurred some time since in a case of paralytic contraction of the foot and knee of a girl a patient in the Institution. After some days' treatment, during which time the patient did not complain of the smallest amount of pain, I noticed an ecchymosis on the great toe; and on removing the instrument, found a black spot on the instep the size of a five-shilling piece. I immediately strapped the foot from the toes to the ankle-joint, and supported the entire limb with a flannel bandage. No pain or inconvenience followed, and for fourteen days it was allowed to remain. From some cause which it is unnecessary to mention, the strapping was removed; the black

* I would here observe, that I have no belief in the "inherent irritability" of muscular fibre; nor do I consider the contraction of muscle after death any evidence of such inherent irritability. Doubtless the muscle is freely supplied with nerves, and those nerves divide and re-divide, and anastomose freely, in every direction, but it is the irritation of these muscular nervous fibres, and that only, in my opinion, which occasions the contraction of the muscle. But this is not, to my mind, to be considered as muscular irritability, but an irritability of the nerves ramifying in and supplying the muscle; this irritability, as a natural consequence, affecting the muscle itself. It behoves us to be cautious in assenting to this or that doctrine without conclusive proof, as by so doing we may mislead ourselves, and place an obstacle in the way of treatment from a wrong impression as to the cause of the disease.

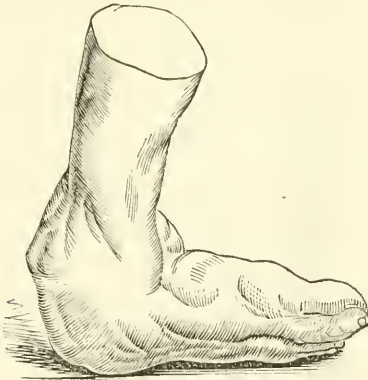
colour, it was found, had entirely disappeared, and the part which was threatened with sphacelus presented a darkish red gelatinous appearance, with vessels ramifying through it, the surface being continuous with the healthy structure. Flour was now applied to the injured surface, and the extremity was covered with flannel bandages, the strapping being omitted. In the course of three or four hours the foot and leg became immensely swollen, red, and painful, having the acute erysipelatous appearance. The removal of the strapping had completely interrupted the restorative process, by withdrawing the uniform support. The capillaries, already weakened by the paralytic condition of the limb, immediately gave way, and became unable to carry on the circulation, from their dilated and over-distended condition, so that a complete stricture, like that which would have followed the application of a ligature, was formed entirely round the injured part, whereby its vitality was entirely destroyed: the part reassumed its black appearance, the slow process of separation followed, and a large wound was the result, which occupied some weeks in healing. The case, however, was very instructive, as it clearly illustrated the weakened condition of the capillary vessels, and the impossibility of the circulation when at all excited being carried on in parts having the low state of vitality which is frequently found to exist along with paralytic affections.

The consequences of removing the support afforded by the strapping in this case was a sort of self-strangulation of the part: the weakened and dilated capillaries could not withstand the full force of the heart; they became over-distended, the blood stagnated in their channels, and the part died from want of a due supply of the vivifying fluid, the blood. I would advise, therefore, that in all cases of this kind recourse should be had to the uniform and constant support afforded by strapping. A bandage, however carefully applied, will not effectually render the absolutely necessary, uniform, and constant support which is attained by strapping. It is well to apply a bandage over the strapping, as it serves to preserve the temperature of the limb. I directed your observation to the necessity of applying a boot and suitable support as soon as the foot was sufficiently flexed, which support must be continued until the weakened muscles have regained sufficient strength to prevent the chance of a relapse. The boot will frequently be necessary for years, as in the case related by Delpsch: it is a great comfort to the patient, and does not interfere with

the motions of the joint, nor will the slightest ulterior inconvenience arise from its use.

I now proceed to consider particularly that species of deformity called *talipes varus*. By *talipes varus* is understood that kind of deformity which consists, 1stly, in the elevation of the heel, from contraction of the *gastrocnemius*; 2dly, in the abduction and semirotation of the anterior portion of the foot by the contraction of the anterior and posterior tibial tendons; 3dly, in a shortened condition of the sole, occasioned, 1stly, by the abduction of the foot; 2dly, by the contraction of the plantar fascia, muscles, and ligaments of the sole. In adults you will find also a great increase of the lateral or transverse arch of the foot, which has been brought on by the constant pressure of the weight of the body, in walking on the outer and dorsal surface of the fifth metatarsal bone, which thus becomes approximated to the metatarsal bone of the great toe (vide fig. 7). You will then find the *os scaphoides* approximated to the inter-

Fig. 6.

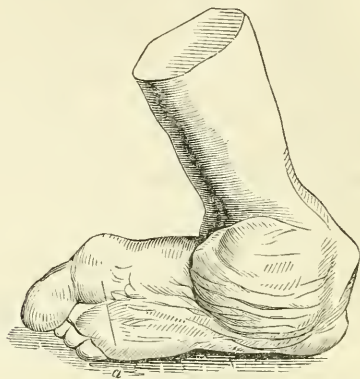


An illustration of the most severe form of *talipes varus*, in the adult, taken from the cast of a patient æt. 24.

nal malleolus, and separated from the external anterior side of the surface of the astragalus. The *os cuboides*, again, is separated on its outer aspect from the *os calcis*, and loosely pressed on its internal side to the inner edge of the articular surface of the *os calcis*, and also of the external portion of the anterior articular surface of the astragalus; this being the principal change caused by the adduction of the foot. We have also the almost perpendicular position of the *os calcis*, as in the *talipes equinus*, and the oblique position of

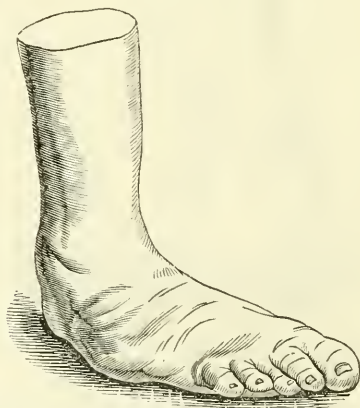
the astragalus. The fourth and fifth metatarsal bones will also be found separated slightly from the outer side of their

Fig. 7.



The posterior aspect of the above figure; *a*. illustrating the approximation of the metatarsal bone of the little toe to the metatarsal bone of the great toe, from the constant pressure occasioned by the weight of the body.

Fig. 8.



The cast of figs. 6 and 7, after the treatment, which occupied ten months, in which the remnant of the cushion on which the patient formerly trod is conspicuous.

articulation with the os cuboides, but the principal change of position is between the astragalus and os scapoides, and the os calcis and cuboid bone. The anterior portion of the foot remains very nearly in its natural relative position, at least so far as the position of the bones is concerned. The

calcaneo-cuboid ligament becomes stretched on its outer portion, and contracted on the inner. The calcaneo-scapoid ligament is also stretched. The superior and external calcaneo-cuboid will likewise be found elongated. The internal lateral or deltoid ligament is contracted. Of course the other ligaments are all more or less changed from their natural length and position, but those particularly mentioned are the most important. In the increase of the transverse arch of the foot in the adult deformity, you will find the transverse bands contracted, and offering a powerful resistance. The muscles which are contracted, and the immediate cause of the malposition, are, 1st, the gastrocnemius, 2d, the adductors direct, viz., the anterior and posterior tibial, the extensor and flexor of the great toe, as well as the extensor and flexor communis indirectly. The peronei are elongated, or rather kept upon the stretch. The contraction of the ligaments does not apply to infants, but becomes so from position. This deformity is both congenital and non-congenital; but in a large proportion it is the most common form of congenital deformity. In the congenital you will find no paralysis; in the non-congenital, paralysis of one or more muscles will very generally be found; and this applies to almost every non-congenital deformity. I have never seen a congenital paralytic affection of any of the muscles in any deformity, nor do I believe that it exists. In the infant you will find the size of the affected limb correspond with that of the well-formed and perfectly proportioned one; but of course, as the child grows, the foot remaining in its false position, and the play of the muscles in that foot being most limited, the muscles, as a natural consequence, become developed but very slowly; and as the child continues to grow, the limb presents the appearance of an atrophied extremity, the natural outline of well-developed muscles being entirely absent; and yet all this arises entirely from want of use, as no paralysis exists, nor any loss of the voluntary power. The temperature of the limb is natural, but the foot does not resist the effect of cold so well as the naturally-placed foot; but this, I imagine, is entirely owing to its passive condition, and not from any diminished nervous power, or loss of its proper tone, as it is not merely the motion of the ankle-joint that is limited; the muscles which move it are of necessity scarcely, if at all, able to perform their functions.

There will be found in the adult, and at all periods from the time the patient begins to walk, more or less thickening and induration of the cellular tissue, corresponding to the

point or points of pressure, which increases the deformed appearance. In the infant you have the round and natural appearance without any addition to the deformity occasioned by contraction of muscles; and upon examining it you find the anterior portion of the foot entirely perfect (vide fig. 9), and that with some little force — oftentimes, indeed, without any — you will be enabled, by *adduction* simply, to place the foot in a straight line with the tibia and fibula, there being no increase of the transverse arch. Occasionally, but very rarely, I have found the plantar fascia decidedly contracted; and this contraction must have existed some time previous to birth, as the skin will be found drawn in: this is, however, the exception, not the rule.

The causes of talipes varus (congenital) are supposed by some to arise from mental impressions, or some sudden fright occurring during pregnancy; others think it proceeds from irritation or disease of the brain, its membranes, or spinal chord. Others have supposed that position *in utero* has produced it. It is true, the mother will, in the majority of cases, assign it to some impression or fright; but this appears to me exceedingly questionable and doubtful, as there is scarcely a pregnant woman who during pregnancy, at one time or other, does not receive some fright, and the proportion of deformities as compared with the number born is very small. Again, very frequently the mother will tell you she can imagine nothing nor recollect anything which could have produced the deformity. On the books of this Institution many cases of this kind will be found; and then nothing is more common than for patients in general illness to be perfectly satisfied that they are aware of the cause of their illness, however wide they may be from the actual fact; so natural is it for the timid to endeavour thus to satisfy themselves. We cannot therefore place much, if any, dependence on these theories. With regard to the brain or nerves of the fœtus being diseased, and thus occasioning it, on this I am also sceptical, for there is not a shadow of proof that such has ever been the case. In the first place, the contracted muscles are not in a state of spasm, neither are those on the outside of the foot paralysed or deficient in any respect, more than this, that the adductors have the preponderance, and that the abductors have not the power to overcome the adductors; but place the foot in its proper position, and you will find that the peronei will hold it out, and during volition evert the foot. The muscles producing the deformity are certainly contracted, but there is no evidence of any irregular action.

The patient can at all times exercise the steady well-directed action of the muscles, even in varus, so far as the deformity will allow ; and the foot remains perfectly quiet in the absence of the voluntary effort. Direct a boy or adult afflicted with varus to draw up his foot (which we frequently do, in order to facilitate the operation), and you will find it done instantly ; direct him also to evert it, and place your hand on the peronei, and you will find them instantly contract, although he may not possess, and does not possess, the power of everting the foot in the least, because of the confirmed malposition. Again, it is a singular fact that, at whatever age the patient may be suffering from talipes varus, neither the contracted muscles, nor those extended, and which have been extended for years, suffer in the slightest degree beyond their want of development consequent upon their want of exercise. This would not be the case if there was any disease of the nerves or their centres. Again, take the non-congenital deformity ; when the disease or irritation of the brain or spinal chord has been the cause of producing paralysis, do we find that we can control or remove the loss of power ? Certainly not : it continues ; and at present we know of no remedy for complete paralysis, the muscle itself wasting and degenerating into a sort of fatty condition. There are cases where paralysis has been the first symptom, and deformity the result ; where every muscle will be found to have recovered itself, after the restoration of the foot into its position and by exercise maintain the motions of the foot ; but this is the exception, not the rule. Whereas, in congenital deformity, it is quite the reverse, and I have never, as I have before stated, witnessed a *congenital paralytic* condition. I cannot, therefore, place any faith in the opinion that the malposition arises from such a cause. Lastly, as regards the position in utero : this I think the most probable cause, although we can have no proof beyond the fact, that in some of the varieties of non-congenital deformity, position appears to favour contraction, and in my opinion certainly does so ; even in cases, you will observe, where the muscles have possessed their power, and have been for years fulfilling their natural functions, yet from being kept in one position they become contracted in that position without any (so called) structural shortening ; even the passive organs of the joints themselves become contracted from position without any change in their healthy condition, or, in my opinion, actual shortening. How much more likely should we consider it that a muscle should become fixed and contracted in the position in which it has

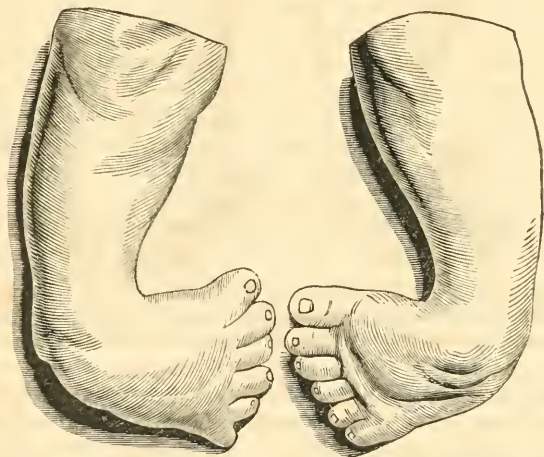
been kept for a longer or shorter period ; therefore, so far as I can judge, I certainly am inclined to regard the exciting cause of the deformity as arising from the position in utero. But we have as yet no proof of this being the fact, and I fear it is not likely we shall find indisputable evidence to establish it.

Patients afflicted with varus have not, as you must perceive, any motions available for walking, in the ankle-joint. They are, therefore, compelled to walk with a perfectly stiff limb below the knee, and the sole of the foot is turned backwards off the ground (vide fig. 7), whilst the dorsum is placed directly forwards (vide fig. 6), the inner portion being elevated, and the anterior portion including the phalanges, metatarsus, and tarsus, being at right angles with the os calcis, astragalus, and ankle-joint (vide figs. 6 and 7) ; hence the peculiar appearance and hideous deformity which these unfortunate objects present in walking, by the anterior portion of one foot being carried over the other during the act of progression, in double varus. In the majority of cases you will find double varus to exist ; there are, however, a great number of cases where only one foot is affected. The pain and inconvenience experienced by the patient is frequently very great, from the constant pressure on one point, and that point being an artificial one, whereby inflammation occasionally is set up in the cushion formed by nature to protect the bones, and is followed by suppuration, and a tedious wound, during the healing of which the patient is totally prevented from using the limb. Even after the wound is healed, great pain and tenderness are experienced, in consequence of the pressure then becoming directed on the bones themselves ; the protecting matter having suppurated, has left them, comparatively speaking, exposed. At all times a great degree of lameness and stiffness in walking is the result ; and yet many walk miles during the day with comparatively little inconvenience. Cases even occur among persons who are compelled to obtain their existence by their daily labour, but most of these unfortunate creatures follow some sedentary occupation, such as that of a tailor or shoemaker ; still we have had one or two instances of agricultural labourers suffering under this affliction, who have been compelled, from the nature of their occupation, to be on their legs from morning till night, and who have not been prevented from following their duties. Occasionally they suffer during the winter from the effect of cold, in the shape of chilblains, but not, I think, more than others do who are not thus

afflicted — at least the congenital. The limb below the knee will be found much wasted ; but although this is the case, yet the muscles still retain their healthy character : the deformity also affects the development of the muscles of the entire extremity, as may be observed in the instances of single varus.

Congenital varus very generally exists without any additional deformity, but cases will be met with in which the knee is also contracted, and in which some irregularity exists, such as an actual deficiency and malformation, and supernumerary toes (vide fig. 9). In this case the child had six toes on each foot, and five fingers on each hand, but this does not appear to occur more frequently in cases

Fig. 9.

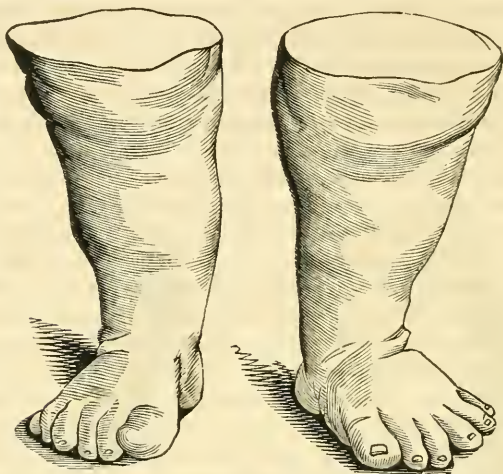


Talipes varus of a child seven weeks old, with six toes on each foot, illustrating the round and uniform appearance of the foot, when not subjected to the pressure occasioned by the weight of the body.

of varus than it does without any malposition of the extremities. Occasionally there will be found a relaxed state of the ligaments of the knee, which admit of a sort of rotatory motion, the tibia on the femur, which gives an additional amount of severity in the appearance of the deformity, the foot appearing to be *rotated* more inwards. This will require attention in the after-treatment. I have seen some few instances of incipient lateral curvature of the spine, in children afflicted with single varus, from the excessive motion kept up in the vertebral column from the

lameness of one extremity. This increase of mobility between the vertebræ will be found to terminate occasionally in lateral curvature, provided the deformity is not removed, and the motions of both limbs made to correspond with each other. This applies to lameness of one or other lower extremity, from whatever cause such lameness may arise.

Fig. 10.



The casts of the feet represented in fig 9, seven weeks after the operation; the little patient possessing free voluntary motion. The anterior and posterior tibial tendons, and the tendo-Achilles, were divided in each.

Cases of varus will be met with in every amount of severity, both in the infant as well as in the adult. In the former the increased severity arises from a more complete and rigid contraction of the muscles alone, whilst in the latter the rigidity will be found to exist in the muscles; and, secondly, by far the most obstinate resistance will be found in the passive attachment of the bones and joints, viz. the ligaments. In the infant, you will be enabled frequently, with but little force, to place the foot in its natural position, and it will return to its contracted state but slowly, and in some cases the foot occasionally assumes its natural position, but seems to invert itself slightly when the muscles are acting. In others a fixed contraction appears to exist, so that after you have abducted the foot it will return by an elastic impulse to its false position, but this depending on the amount of the muscular contraction. In the case I mentioned in my first lecture the contraction was complete

previous to the operation ; yet upon examining the tendons a linear cicatrix could be detected, and that only after maceration, and then very imperfectly. And yet the foot was held and maintained in its natural position, and the little patient up to the time of its illness could use it freely in that position.

I have never witnessed any spasm in true varus simply, nor do I think that it exists. The return of the foot to its false position after it has been forcibly held out is not the result of *spasm*, but of the return of the muscle to its contracted position which has thus been forcibly drawn out. Again, where is the evidence of spasm after the cure is effected, when the patient possesses the voluntary movements, and freely exercises them? In fact, as far as my observation goes, there is no diseased or unhealthy action of the muscles contracted. In the adult, and during the period of youth, you will also meet with the deformity in every amount of severity. In some cases a great amount of motion will be found on any attempt to abduct the foot; in others there will be found the most firm and unyielding resistance, which appears to depend considerably on the health and constitution of the patient, more so than on the occupation they may have followed. One of the most severe cases we have had in this Charity, and which was the longest under treatment, was that of a female 24 years of age, of which figs. 6, 7, and 8, are from the cast. But it must be borne in mind that the increased severity in an infant is dependent solely on the greater amount of contraction in the muscles themselves ; not so, however, in the adult. In these, the severity will be greatly increased by the contraction of ligaments, from position, in the muscles, as well as the tone of the ligaments themselves ; for the more robust the health of the individual (as a rule) the more firm and dense the resistance. You have also the additional deformity in the transverse arch of the foot in the adult, which is occasioned by the pressure of the weight of the body, to which the infant is not subjected, and which is no slight obstacle. (Vide fig. 7.)

The *treatment*, which we now come to consider, resolves itself into the mechanical solely, or surgical and mechanical combined. With regard to the mechanical, I think sufficient evidence is daily before us of its general failure, from the results witnessed of patients who have been subjected to stretching and rubbing, and the wearing of instruments all their lives ; and the existence of this Institution is an evidence of its general utility. I have not much,

therefore, to say upon this head. It will undoubtedly reduce the severity of the appearance of the deformity, and may, in the slightest amount of contraction, perhaps effect a cure, — at least, we are told it does so. I can only say, I have tried both in congenital and also in non-congenital cases, when the deformity has been slight, and the contraction of the muscle very limited, but I cannot bear testimony to its success on the one hand, or the propriety of it on the other. I have no doubt it is a very *profitable* method of treatment, for under the most favourable circumstances it must be of long duration. Therefore, both to the attendant and the machinist, it is thus far successful; but it is not for the pecuniar benefit of those who would ascertain the best method of making the most of their patients, that I have given you my ideas upon this subject. The horrors of an operation are also removed, which, to the patient, who can know nothing about it, are not insignificant; the very idea of the knife is to many an insurmountable objection. Therefore, in these instances, mechanical treatment is the most satisfactory to the patient, and should apparent improvement be observed, they will be perfectly content, which is sure to be the case, as no case presents itself in infancy that cannot be much improved in appearance by the hand alone; but I have not seen a perfect cure by mechanical means, although I have heard of it. The deformity in infants, as I have endeavoured to prove to you, is the result of, and maintained by, the action of the muscles alone; it is obvious therefore, that the more speedy and easy the method of cure, and the less painful it is to the patient, the better; the motto "*cito tuto et jecunde*" must apply here, as well as to every other disease we are called upon to treat. If, then, the division of the contracted muscles will effect this, there can be no question of the importance of its necessity. The next question is, what is the most favourable time for the patient—in the early months of infancy, or at a later period? I know it is, and has been, recommended to postpone it until the period at which the child would be expected to walk, and to endeavour to abduct the foot by the constant application of splints up to that time. My opinion, however, is, that if it be necessary to perform the operation, the sooner it is done the better, for it must, I think, be evident that a great advantage must be gained by the patient, as the foot of necessity will grow in the position in which it is placed. It must, I think, be admitted that the growth in the natural position is far preferable to the growth in the deformed

position, both as regards the muscles and the ligaments of the joints. And again, in infants of a few weeks old you have no additional irritation to contend with, and the foot becomes placed in its proper position previous to the irritation of teething, or to the numerous ills to which children are subject. The maintaining the foot in position at this early period, after the contraction has been overcome, is a matter which occasions no pain nor inconvenience, with the most ordinary attention; much less than the constant confinement in a splint, with the muscles resisting. Again, if proper care be taken, the development of the muscles becomes thus naturalised, and the diminished development consequent upon their passive condition, even in infants is prevented. Thus, in every point of view it appears to me to be decidedly preferable to operate at the earliest opportunity. I have frequently performed the operation on infants of not more than five weeks of age, and should always recommend it to be done at this early age when opportunity offers.

The muscles whose tendons you will find it necessary to divide in every confirmed case of talipes varus, are, as you may have already anticipated, the anterior tibial, posterior tibial, gastrocnemius, and when the plantar fascia is decidedly contracted, it will be as well to divide that also. The posterior tibial is the first muscle I would advise you to divide, inasmuch as the gastrocnemius assists to hold the foot firmly. The method I have adopted is the following:—let the child be laid horizontally on its back; and let the leg to be operated upon be everted so that you have the inner side facing directly upwards; you thus have the tendon directly before you: you will then feel for the tendon, which in a thin child can easily be felt to rise under the finger upon any attempt to abduct the foot. In a fat child, however, you will not be able to do so, for you must recollect it is the edge of the tendon which presents itself, and not the flat surface. The guide I then find successful is the internal edge of the tibia (which can at all times be felt with more or less pressure), and the tendon, as you are aware, lies directly behind it, and close to it. Having, then, the foot and leg firmly held by an assistant, you place the thumb of the left hand on the edge of the tibia, or close to it; you then, with a small scalpel, puncture the fascia by passing it perpendicularly down, and with care, or you pass the instrument too far, and puncture the artery. But if you do it slowly and cautiously, you will be enabled by a sort of grating sensation to feel the fascia, in which you make a

small slit; you then withdraw the scalpel, and introduce the blunt-pointed knife in a perpendicular direction also, or you will get on the tibia on one side, behind the tendon on the other, from its close approximation to the bone. As soon as you have got the knife before the muscle, or what you imagine to be so, depress the handle, and satisfy yourself, by the resistance, that it is so: turn the sharp edge to the muscle, and divide it, directing the assistant at the same time to forcibly abduct the foot. You are aware that the artery lies very near to the posterior tibial and flexor digitorum muscle, and if you do not exercise great caution and judgment as to the distance, you may divide that also, which it is prudent to avoid: although at present we have seen no ill effects from complete division of the artery, yet we are not to imagine such will always be the case. You may form some idea of the proper distance by letting the knife touch the edge of the tibia first, then pass it onwards about a quarter of an inch, and divide the muscle. You must recollect that in infants muscular fibre exists almost down to the internal malleolus, so that the division will not give so sudden a sensation as of the division of tendon alone; but in all cases, I am confident, if the muscle is divided, the sensation must be communicated to the hand of the assistant. After having divided this muscle, place a piece of lint on the point of puncture, and keep the finger on it, and then proceed to divide the anterior tibial. This tendon you will generally be enabled to feel as it passes over the joint on the inner side, but in fat children you will experience great difficulty in finding it. It is better for you to satisfy yourself previous to introducing the knife of its position, as it is then done with the greatest facility. Having found the tendon, you place the fore-finger on it, and introduce a sharp-pointed knife under: the assistant at the same time abducting the foot, as in the other instance. Let a piece of lint be applied, and the child turned on its face, so that you may have the tendo-Achilles directly before you. Here I would beg to caution you as to the position of this tendon, as you will not find it in the median line, as in the normal position of the foot, but considerably inclining to the inner side, lying directly over the vessels and posterior tibial tendon; and although with care you will find it easy to divide, yet caution is requisite or you will transfix it on the one hand, or, by puncturing a little too deeply, puncture the posterior tibial artery on the other, which latter accident has actually happened. The manner of dividing it is the same as I detailed to you in a former lecture.

Having, then, divided the three muscles, you apply lint and strapping, and support the foot with a bandage; this you will allow to remain for three or four days, or until the punctures are healed. You then apply your mechanical apparatus, either Scarpa's shoe, or a common tin splint in infants, having one side-piece, but extending only to the ankle, protecting the heel from pressure by padding the leg just above the os calcis, then strapping the splint to the leg, and leaving the foot free; the abduction may be easily effected with a small bandage passing round the anterior portion of the foot and splint, gradually bringing the foot to the splint, and, when the abduction is complete, by bending the splint gradually, you may then flex it. This plan I have frequently followed with complete success. If with Scarpa's shoe, first abduct the foot gradually, taking care the child is not in pain, and that there is no undue pressure. After the abduction, proceed gradually with the flexion, as in talipes equinus (which, in fact, it will then become), until it is bent beyond a right angle. You must then direct the mother how to apply the instrument, and let her take it off once or twice daily, with a view of exercising, with her hand, the motion of the joint. But do not allow this until all firm resistance is overcome, or you will find that the foot will almost invariably relapse to its former position. The time occupied will vary, according to the rigidity and severity of the case, from fourteen days to six weeks or two months; but you ought certainly to get it in position by that time, unless there has been any casual interruption to the treatment. In youth and adult deformity, you will proceed in the same way with the operation, but as there is no superfluous fat, you will be enabled to feel the posterior tibial tendon with ease; as oftentimes, by directing the patient to abduct his foot, a portion of the tendon rises above the bone. The anterior tibial tendon and the tendo-Achilles are also well defined, so that the operation is greatly simplified.

Other methods have been adopted in dividing the tibialis posticus — 1st, that of passing a sharp-pointed knife behind and beyond the tendon, and then cutting directly onwards or inwards, according to the position of the leg. But by this method you run the risk of puncturing the artery, and of breaking the point of the knife in the bone, which I have seen done; whereas, in the method I have adopted, you do not stop the integrity of the sheath or periosteum, except at the point of puncture, and thus avoid adhesion between the new uniting medium and periosteum.

In these cases, when the patient has walked for a greater or less number of years on the dorsum of the foot, where the ligaments of the foot have become contracted, and offer a firm dense resistance, you will find it impossible to proceed quickly. You will first, by a straight splint, abduct the foot, and, if in the adult, divide only the anterior and posterior tibial and plantar fascia at the first operation, with or without the flexor longus pollicis; and after you have abducted the foot, divide the tendo-Achilles, and proceed with the flexion. The reason for dividing the whole at one operation, in the infant, is, the short time occupied in abducting the foot, so that time is not allowed for the new uniting medium to offer any resistance; whereas, in the adult and youth, the time occupied in abducting the foot is sufficient to enable the new substance to become firm, and offer as much resistance, or nearly so, as before the operation. In dividing the plantar fascia I would advise you to be cautious, and not to insert the point of the knife too deeply, as you may puncture either of the plantar arteries: should you do so, you may be compelled to take it up.

A boy of about sixteen years old, who I assisted to operate upon, had the internal artery punctured. Compression was kept up for weeks, at the end of which time it appeared to have completely healed. This lad afterwards came under my own immediate care. The extension was then commenced, and continued for three weeks, at the end of which time a lump was noticed on the sole of the foot. On carefully examining it, with my friend Mr. Ormerod, we could detect no pulsation, and decided upon laying it open. Upon introducing the lancet, clots of blood escaped to the amount of two or three ounces: I made a crucial incision, and cleared the whole out. I then placed a firm compress on the sole, and kept it fixed by strapping and bandages, and sent him at once to bed, keeping the foot raised by means of a pillow. For three days, all appeared going on favourably. On the third day, however, the nurse sent round in a great hurry to say the boy was bleeding. When I arrived I found the bleeding stopped, and thought it possible it might be a discharge of blood and matter. However, on the following morning, it again returned, and evidently was pure arterial blood. I then called Mr. Lawrence into consultation. He agreed that it would not be prudent to delay the attempt to take up the artery. In the afternoon, with his most kind assistance, I laid open the sac freely, and found the sole of the foot full of clots of blood, matter, and shreds; on removing which,

the artery was seen to bleed freely. A ligature was then passed under it by means of the needle, and tied, which effectually controlled the hemorrhage. The boy felt a twitching pain, which was allayed by opium, and much to my surprise, not a bad symptom followed. The ligature, however, has not as yet come away, eight or nine weeks now since the operation. But a more troublesome or difficult operation cannot well be imagined. You will therefore see the necessity of being cautious. This, I must observe, is the sole instance of this accident that has ever occurred, but it is sufficient to teach us a useful practical lesson. Compression on the posterior tibial artery did not control the bleeding in the least; compression on the anterior and posterior, however, did control it to a great extent, but not completely, so that we had no alternative but to take up the artery as I have before described to you.

The time occupied in treating a bad case of talipes varus will vary from two to six, eight, or ten months, as it is impossible to overcome recontracted tissues, except by the most slow and cautious proceeding, and it will require the greatest vigilance to prevent a slough on the points of pressure. After you have abducted and flexed the foot, you will frequently find, as I pointed out to you, the tarsal extremity of the fifth metatarsal bone projecting considerably, so much so, that the weight of the body is thrown completely upon it, rendering it impossible for the patient to walk without some protection. I have used and found a spring pad, similar to a truss, well applied, raise it sufficiently to prevent any inconvenience, the one passing on the inner side, and upon the under surface of the fifth metatarsal bone, the other on the upper surface of the first and second metatarsal bones, and which, by the constant pressure of the spring, gradually reduces the arch of the foot, and raises the fifth metatarsal to a level with the sole. But this, I must tell you, is a tedious proceeding, and so, in fact, is the whole process. After the foot is in position, you will order a boot and support to be worn until the ligaments have gained strength in their new position, and also order the patient to flex and extend the foot night and morning. The cure in these cases depends on the restoration of the balance of power, especially in infants. You cannot fail to have observed that the peroneii have become weakened from their having been kept constantly on the stretch; and immediately after the foot has been brought into position, it cannot be expected that these muscles will be enabled to keep the foot in its proper position; you must

never, therefore, allow the foot to be without the instrument, or boot and support, night or day, until sufficient power is attained by the muscles to keep the foot in position; as, should you do so, the cicatrix will not only have drawn the two ends of tendon together, but the anterior and posterior tibial muscles will gain the preponderance of power, and render it impossible for the peronei to recover themselves; This applies more particularly to infants and young subjects, as it cannot be expected that perfect motion can be recovered in complete varus of the adult, although they always possess limited motion. It is not necessary to interfere with the usual diet of the patient, either immediately following the operation, or at any time afterwards, but it is as well to guard against children taking indigestible food, as you may have suppuration and erratic erysipelas set up after the wound has healed, as in the following case.

About three years since, I operated upon a child two years of age, for this deformity, and divided the tibialis posticus by making an incision and taking up the tendon on the director. The wounds healed by the first intention, and everything proceeded favourably until the ninth day, when, to my great surprise, I found the parts surrounding the points of incision swollen, red, and painful. The instrument was left off, cold lotion was applied, and purgatives, with liq. antimonii tartarizati, was administered. On the following day the inflammation extended as high as the knee, and the leg became œdematous. The inflammation continued to increase the two following days, until the redness extended as high as the anterior superior spinous process of the ilium. The purgatives were continued, and on the fifth day balls of currants were passed; from which time the erratic erysipelas subsided immediately.

This case excited a great deal of uneasiness, as you may suppose; but it gave good practical experience on the important point of totally forbidding any kind of indigestible articles of food to be given to the patient during the early period of treatment.

LECTURE IV.

TALIPES VARUS NON-CONGENITUS—TALIPES VALGUS—TALIPES
EQUINO-VARUS—TALIPES EQUINO-VALGUS.

I SHALL now proceed to describe the species of deformity called talipes varus non-congenitus. In this deformity you have the same relative position of the bones, muscles, and elongation of the ligaments, but rarely if ever the same amount of rigidity. It arises, 1st, from the irritation of teething, as, in fact, does almost every distortion of the foot; 2dly, from inflammation of the joint; 3dly, from measles, small-pox, and any cause of irritation of the brain and spinal marrow. When it arises from the irritation of teething, or any cerebral irritation, it comes on gradually, either preceded by complete paralysis of the entire side or extremity, or of the abductor muscles solely: frequently the deformity is combined with talipes valgus of the other extremity, of which we shall have to speak hereafter. Upon the recovery from complete paralysis, one or more muscles remain paralysed completely; and, of course, those recovering their lost power, having no active opposing force, draw the foot in this or that position, according to the muscles so affected.

Fig. 11.

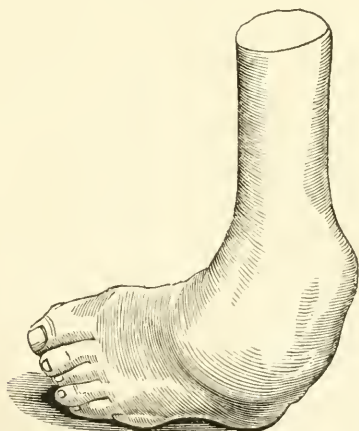


Illustration of talipes varus non-congenitus, taken from a boy fourteen years of age, both feet being affected from the irritation of teething when two years old.

In talipes varus non-congenitus the tendo-Achilles will

be found contracted, and the posterior tibial muscle, occasionally the anterior tibial, will be found paralysed; and the deformity appears, in some instances, to have been determined by position, the weight of the body pressing the foot over, and thus producing it; and this would be more likely to produce an inversion than an eversion of the foot, when the heel is completely elevated. In all cases of non-congenital deformity, where partial paralysis coexists, you have a greater amount of atrophy of the entire limb, especially below the knee, when it is confined to the foot, as in this instance, and you will find that definite outline, so conspicuous in congenital talipes varus, equally entirely absent; but there will be an unnatural smoothness of the foot, so much so, that you will, after some experience, be enabled to tell at first sight a congenital from a non-congenital distortion. There is also, as I before mentioned, in talipes equinus, a diminished nervous power, the limb rarely retaining its natural heat even during the summer months; and in the cold weather patients thus affected suffer periodically from chilblains.

Patients afflicted with non-congenital varus suffer much more pain and inconvenience in walking than those who are afflicted with congenital varus only, as the cushion, upon which they walk, is much more quickly and easily irritated, owing to the diminished vitality, or nervous power of the skin, on the one hand, and from the relaxed condition of the ligaments on the other; for although the ligaments, from position, become contracted, yet they do not possess that tone and rigidity which they do in congenital deformity; and the ligaments on the external side of the joint, namely, the external lateral ligaments, which have become elongated, do not appear to hold the foot sufficiently firm to give steadiness to the joint: hence the great weakness experienced by the patient. When the cause of deformity arises from inflammation of the joint, you have of course no paralysis, nor any effect similar to that just detailed, the deformity having been occasioned by position; and you will rarely find that complete inversion of the foot which is found in congenital cases, the patient walking more on the anterior and outer side of the fifth metatarsal bone (vide fig. 11), and the foot having a more uniform sweep from the os calcis to the toes. I have a case of this kind now under treatment, in an hysterical female, where inflammation has been for some time existing in the ankle, and the foot has gradually become inverted by the constant action of the anterior and posterior tibial muscles, together with the gastrocnemius;

no paralysis existing in the peroneii muscles. But the anterior tibial, and also the posterior, as well as the gastrocnemius muscles, are in a constant rigid condition, without the foot being touched, or any force being applied to abduct it.

The treatment of non-congenital is precisely the same as the treatment of congenital deformity; that is, the division of the anterior tibial tendon (if contracted), the posterior, and the tendo-Achilles, as well as the plantar fascia. You must direct your attention especially to the natural heat, and proceed more cautiously with the mechanical treatment than you will find it necessary to do in the congenital deformity, from the inability of the skin to bear much continued pressure without its vitality being destroyed, which must be most carefully guarded against, as this interferes with and prolongs the treatment, allowing the newly-formed substance to gain strength, without your being able to extend it when newly formed, and thus increasing the difficulty in the after treatment. After the foot is brought into its normal position, greater care will be required to keep it so, as the attachments of the joint being weakened from the general loss of tone, and one or more muscles being paralysed, it appears, and is in fact, comparatively unattached, and will yield in any direction it may be pressed in by the weight of the body; so that you must see the necessity for the most perfect and firm support after the foot is in position; which support will, in all probability, be required for years. You cannot be too minute in your directions to the machinist, or in cautioning the patient. In this case, also, the foot must be supported during the night, as any motion, even without the weight of the body, keeps up the play allowed by the relaxed condition of the ligaments, and prevents their contracting upon themselves, which they will do in these paralytic cases, if the position is constantly maintained, and the muscles have become sufficiently strong for the patient to walk with a common boot without support. But this must be the result of time.

In contractions arising from disease, of course you will not think of operating until all symptoms of it have disappeared. You may, however, improve the position of the foot, and prevent an increase of deformity, by carefully applying a splint, and by the constant and almost insensible extension you can keep up by means of a bandage; which at the same time that it prevents and diminishes the deformity, also assists the restorative process, by keeping the limb perfectly steady, so that the patients experience great

comfort from it; and this method may at all times be adopted, and will not interfere with the treatment you are pursuing in order to remedy the disease under which the patient may be labouring.

After the disease has subsided, the tendons should be divided in the usual manner, and then proceed with the mechanical treatment: and as soon as the foot is brought into position, exercise the motion of the joint, to prevent it becoming fixed by the adhesion or alteration of structure in the synovial membrane: this can be done by means of the instrument, which will effect it with less pain to the patient, and with more certainty, than by means of the hand. As a guide in the treatment of talipes varus generally, the patient ought never to suffer a sufficient amount of pain to interfere with his general health or rest. The most severe cases may be treated in such a way that the patient will be subjected to very little or no pain if proper care and due diligence be used by the medical attendant; of course there will always be found more or less uneasiness from the constant stretching of the ligaments of the joint. This applies not only to varus but to every deformity, and will be found the safest as well as the most speedy method of cure.

We now come, gentlemen, to another species of deformity of the foot, viz. talipes valgus, or flat foot, vulgarly called splay foot. This deformity is exactly the reverse of the last considered, and I would first draw your attention to the anatomical condition of the foot, as this deformity more than any other depends primarily for its cause on the ligaments or passive attachments of the sole of the foot. It will be recollected that the calcaneo-scapoid ligament, and the ligamentum scaphoido cuboideum plantare, together with the ligaments connecting the scaphoid bone with the cuneiform bones, form the principal support to the arch of the foot, *i. e.*, passively; you have also the plantar fascia, with the flexors, which assist materially, as well as the muscles of the sole, and the tendons passing into and through it; but these muscles cannot and do not exercise much influence except during the active condition; they depend in a great measure on the integrity of the form of the foot for their perfect and full amount of motion. Now the arch of the foot must be considered as a double arch; first, the the natural arch, as understood generally, extends from the heel to the great toe, and 2ndly, the lateral arch, or bridge from side to side, formed by the scaphoid, cuboid, and cuneiform bones, and extended to the tarsal extre-

mities of the metatarsal bones; and the points of pressure are the posterior inferior extremity of the os calcis, and the anterior inferior extremity of the metatarsal bone of the great toe, and the anterior inferior extremity of the fifth metatarsal bone, or little toe. Now as long as the bones of the foot are held in their natural position, and no paralysis of the moving powers exists, free motion and elasticity in walking is derived from the arches described; but the moment the arch of the foot is diminished, the motions of the foot become limited, and ultimately, in the more severe cases, where the arches are entirely destroyed, it is altogether lost. The origin, then, of this deformity is a weakness or congenital elongation of the ligaments of the sole, and the muscles having a weakened instead of a firm point of insertion (for their insertion must not be regarded individually but collectively), will, in their action, assist the weight of the body in increasing the malposition. This deformity is both congenital and non-congenital, as you may have anticipated, and consists in a yielding or falling of the arches of the foot, the os scaphoides projecting and

Fig. 12.

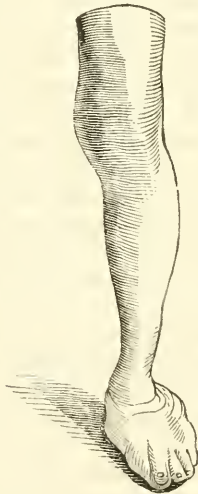


Illustration of congenital talipes valgus, in which may be observed the most complete flattening of the foot, no trace of an arch being left.

touching the ground on its inner and under surface, the head of the astragalus separated, of course, slightly on its inner side from the corresponding articular surface of the os

scaphoides; the ligaments I have before mentioned connecting the scaphoid with the os calcis. The scaphoid, with the cuboid and cuneiform bones, become elongated, and allow the arch to sink. The internal lateral ligaments become secondarily affected and elongated, and allow the astragalus in some cases to fall, and thus to lie obliquely in the articular cavity, whilst the external side of the os calcis is approximated to the external malleolus. This is the foundation, and what I imagine to be the origin, of this species of deformity. The next change that takes place is the abduction of the anterior portion of the foot, *i. e.*, from the head of the astragalus, and appears to arise in the following way:—as the firm connexion of the bones of the foot is destroyed, or for a time lost, it would yield in any direction in which it might be drawn by the muscles passing to and through and over the tarsus during their natural action, and as the extensors of the toes. The peroneus tertius on the dorsum, the peroneus brevis on the outer side, and the long peroneus passing beneath, have a powerful leverage, in consequence of their passing under the external malleolus; hence the long extensors of the toes and the peroneus tertius in their action have a secondary effect in raising the outer edge of the foot beyond its natural position in part only, not altogether. The peroneus brevis and longus have also a secondary effect, *i. e.*, abducting the anterior portion of the foot; hence the contraction from position of these muscles, and, as will be seen afterwards, the necessity of their *section*. With regard to the congenital form of the deformity, I have told you in my last lecture that, in my opinion, it is position in utero, and position alone, which occasions this kind of deformity, as well as other congenital deformities that exist without malformation. There is no evidence whatever of spasm existing; the muscles are contracted, but not spasmodically; for I understand by the term spasm an irregular action of the muscles which is produced during the exercise of volition, and in defiance of volition. Spasm is never found to exist in the deformities I have mentioned, nor in the particular one now under consideration. In the congenital there is a more complete flattening of the entire foot (*vide* fig. 12); it is not confined, as in some instances of non-congenital deformity, to the internal side of the foot, but extends, as in the case before you, to the entire foot; there being no trace of an arch left, or in all probability none had ever existed, but from the circumstances before pointed out the muscles before mentioned had become contracted. The same di-

minished development of the muscles is here evident as in congenital varus, but to a much less extent, as although there is certainly a contraction of muscles mentioned, yet from the nature of the deformity the contraction is much less, and admits only of a limited amount of contraction compared to the great change in the position of the foot in talipes varus, and although contracted they possess great powers of motion — excepting only in the most severe distortion; and even here, as must be obvious, the extent of contraction cannot be very great. The non-congenital *T. valgus* arises generally from the patient having been in the habit of carrying heavy weights, or from being for many hours successively on his feet; at least these are the causes usually assigned. But there can be little doubt that there must be a predisposing cause, viz. general debility, which renders those suffering under this distortion incapable of bearing that great degree of exercise or bodily fatigue which persons whose existence depends on their daily labour are compelled to undergo. We have had two remarkable instances of this deformity lately in the institution, the one a boy about 17 years old, the other about 20; the former was a grave-digger, the latter a farmer's labourer. The first thing which attracts the attention of the patient to this deformity in its incipient state is a sense of weakness, more especially on the outer side of the ankle-joint, and the projection of the scaphoid bone with the head of the astragalus: they then observe the flat appearance of the sole of the foot, and the tendency of the inner ankle to approach the ground in walking: as the deformity increases, the pain in the joint and the sense of weakness increase to such an extent, that the patient becomes totally unable to follow his ordinary occupation. And although the internal malleolus does not touch the ground, yet it appears to do so. In the majority of cases the contraction becomes permanent of the peronei and extensor of the toes, which will be found prominent, and extremely tense, on any attempt to adduct the foot, offering the most dense and unyielding resistance, and in the case of the grave-digger above mentioned the anterior tibial tendon also became contracted; I imagine, from the constant instinctive efforts made to raise the arch of the foot. In such cases the joint becomes immovable, which arises, I suppose, from the circumstance of the astragalus lying obliquely in the articulation — its inner edge fallen, and its outer edge raised. Thus the synovial membrane becomes pressed upon constantly on the two lateral points of pressure, which it is not accustomed to bear. This, with the constant

stretching of the ligaments, is the cause of the pain, which at times is most severe.

In some cases of non-congenital talipes valgus you find the whole ligaments of the foot in a loose state, allowing of

Fig. 13.



Illustration of the most severe form of non-congenital talipes valgus, taken from a patient *æt.* 17, both feet being similarly affected.

Fig. 14.



The above, after treatment, which occupied three months. The anterior tibial, extensor communis digitorum, peroneus, tertius, longus and brevis muscles, were divided.

undue motion in any direction ; it is not confined to those supporting the arch, but it is extended to the whole foot ; here you will find no contraction of the muscles. Although when the foot is pressed upon by the weight of the body it is perfectly flat, yet when raised from the ground the patient possesses power to move it in any and every direction, so that time is not allowed for contraction of the muscles to

take place. For instance, when the foot is on the ground, the peronei and common extensor muscles are somewhat shortened, or have a diminished extent of motion; the moment the foot is removed from the ground the anterior and posterior tibial muscles raise the arch, and then each alternately being elongated or shortened, no fixed position is maintained. The peronei muscles are not permanently shortened, and consequently no contraction arises. We have amongst the out-patients at this time a case in point. It is a difficult variety, because there is no fixed point to act upon, and the great difficulty which will be found to present itself is the maintaining of the foot in a constant position, for if this position cannot be maintained a cure cannot be effected. And the difficulty of maintaining this position is much greater than you would have anticipated *à priori*; it being not a part but the whole of the connection of the bones of the foot that requires support. In true talipes valgus congenitus I have never found paralysis of the muscle, but in a species of valgus which I shall hereafter mention, it is a common occurrence. I have met with the deformity, where it was supposed to arise from rheumatism, in the case of a patient about 40 years of age, at least that was the cause assigned, and when I first saw the patient he was suffering from some rheumatic affection. The peronei muscles were exceedingly tense, as well as the extensors of the great toes. The arch was fallen, but I have reason to believe that the circumstance of the rheumatic affection first drew his attention to the deformity, as I ascertained upon inquiry that he had experienced a weakness of the joints for some time previously. Strange as it may appear, patients suffer much more pain and inconvenience from this species of deformity than from the more severe distortion of varus.

The method for the treatment of valgus, which I have usually adopted, is as follows. When the contraction of the muscles is rigid, both in congenital and non-congenital cases, section must be had recourse to; at least I would advise it. In congenital cases, as far as my observation goes, it is invariably necessary, although the deformity may be slight, and the foot is easily brought into and held in position. We have patients now standing on the books, in whom, from a few weeks after birth, the most careful and constant mechanical means were adopted, and the foot during the time these means were applied was held in position; but the moment the feet were released from the instrument the deformity returned: even after a period of twelve

to eighteen months, and where I have since divided the muscles contracted, viz. the peronei and common extensor of the toes, a cure of the deformity has very quickly followed, and all tendency to contraction has subsided. I have operated on a child five weeks old, and after a month's treatment, the foot did not, when taken out of the instrument, return to its malposition. Therefore there is no doubt in my mind as to the mode to be adopted. The operation is unattended with pain, or comparatively so, as the child will take the breast immediately afterwards, and no ill consequences are to be anticipated with the most ordinary care; therefore there is no argument against the propriety of operating. After you have thus overcome the resistance of the muscles, the placing and maintaining the foot in position at this early age is an easy matter, as you have no additional obstacle or resistance, and the ligaments grow into their natural position; and the muscles are also enabled to act in their normal direction. The overcoming and preventing the contracted condition of the muscles at this early age is of great importance. The mode of operating is as follows. Let an assistant with one hand hold the leg firmly, and with the other abduct forcibly the foot, which renders the peroneus longus and brevis muscles tense. The leg lying on its inner side, the outer side being upwards, you then with the forefinger of the left hand feel for the tendons and also the fibula. You will generally find the tendons raised above the level of the fibula, and a space between them and the bone. You then introduce a sharp-pointed knife between the bone and tendons, with its flat surface to the bone, about an inch and a half or two inches above the joint, to about half an inch in depth, *i. e.*, beyond the external edge of the fibula, or as far as your judgment will direct you; turn the knife with the sharp edge to the tendons, and cut them transversely. This is my method of operating, and the one which you will find the best. You can adopt a plan I have sometimes witnessed, namely, that of passing the knife behind the tendon and cutting from within outwards upon the fibula; this method, however, is less certain, and you run the same risk as in the division of the posterior tibial tendon, of breaking the point of the knife on the bone. As soon as tendons are divided, a sudden jerk will be communicated to the hand of the assistant, and if both are effectually divided a double jerk will be felt, the one following the other immediately, especially in adult cases. In infants the muscular fibre extends much lower, and this distinct sensa-

tion is not felt, although if divided a sense of yielding must be felt. After dividing the peroneus longus and brevis muscles, you proceed to divide the extensor communis digitorum and the peroneus tertius, which is done in the following manner: Let the patient lie on his back or side, and let the assistant adduct the foot as in the former instance. Introduce a sharp-pointed knife to the inner side of the extensor communis, just where it passes over the ankle-joint; pass it beneath these tendons and the peroneus tertius, with the flat surface towards the tendon: as soon as you have inserted the knife behind the whole of them, turn the sharp edge towards the tendons, depress the handle, and divide them: from their prominent position you will have no difficulty in feeling them, or ascertaining if they are completely divided. You then place a piece of lint on the points of puncture, and secure it with strapping. Bandage the foot from the toes upwards. Let the foot be kept at rest in the horizontal position and (as in the method of treatment of the other cases I have before described), let it be kept warm; at the end of three or four days you may remove the bandage and strapping, and you will find the puncture healed. You then commence the mechanical treatment, which consists in gradually adducting and depressing the foot, at the same time that you support the arch, so that the new uniting medium becomes stretched at the same time that you are pressing the bones of the foot forming the arch into their normal position. I have found a splint, extending from below the knee to the inner ankle, with a spring attached to its extremity, to extend the length of the foot, very useful, the spring having a soft pad attached, directly opposite and rather beneath the os scaphoides. The splint being well padded, and carefully bandaged on the leg on the inner side, then apply a strap, or adhesive plaster, round the extremity of the spring and the anterior portion of the foot, gradually tightening it as much as the feelings of the patient will admit of: in this way the arch may be restored with great comfort to the patient, as the pressure and counter-pressure are equalised, and all danger of sloughs from undue pressure avoided. In infants you will find it of the greatest possible advantage. As soon as you have raised the scaphoid bone, and restored the arch, commence the flexion of the foot with Scarpa's shoe, and when beyond the right angle, let the patient have a boot with a cork sole and a support attached, so that he may be enabled to take exercise, at the same time that the ligaments of the foot are gaining strength. In the most severe

cases, where the anterior tibial muscle is also contracted, you will find it necessary to divide the tendon of that muscle at the same time, in the manner described in a former lecture ; and in severe congenital cases, as represented in fig. 12. p. 69, when the deformity has been allowed to exist for years without any attempt being made to relieve it, you will find every muscle surrounding the joint contracted. The following is an instance :— A patient, 15 years of age, was born with this deformity in both feet, and about two years since was operated upon and treated mechanically without relief. Upon examination, the feet presented the appearance represented in fig. 12. The patient was totally unable to walk, from the great pain occasioned when the feet were subjected to the weight of the body. Upon attempting to adduct the feet, the peronei and common extensor were rendered extremely tense ; upon attempting to flex the foot, the tendo-Achilles was also tense ; and upon an attempt to depress them, the anterior tibial and extensor proprius pollicis were also tense, there being the smallest possible amount of motion in the joint, and that of an unyielding character. I therefore proposed the division of the tendons of the whole of these muscles as the only prospect of relief, which was assented to. I first divided the peroneus longus and brevis, then the extensor communis, digitorum, and peroneus tertius, afterwards the anterior tibial and extensor proprius pollicis, and lastly the tendo-Achilles. Lint and bandages were applied, and allowed to remain on a week, the patient having suffered no pain beyond that immediately following the operation. At the end of that time I applied one of Scarpa's shoes, and flexed and extended the foot alternately night and morning, so that the uniting medium of each tendon might be acted upon, the foot being adducted the whole time. At the end of three weeks the motion of the joint was restored perfectly, and the patient possessed the power of flexing and extending it at will.

This case is of great interest, as it would appear that the gastrocnemius had become contracted from position, the feet being at right angles ; and also, that the means adopted were those only which could have succeeded, as the division of one without the others, would have effectually prevented, as in fact it had done, the restoration of the feet to their normal position, or the return of the motion of the joint. I have never seen this condition in the infant afflicted with this deformity, and can account for this additional contraction only by the constantly maintained posi-

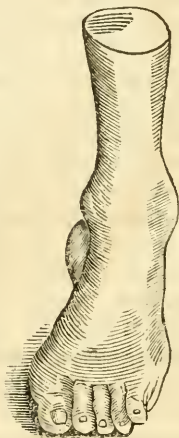
tion at right angles. Should you, therefore, meet with such a case, I would advise your adopting a similar plan of treatment.

The time occupied in effecting a cure will vary according to the extent of the displacement and rigidity you may have to contend with. In infants or young children it will occupy from four to six weeks: in the adult deformities, however, it will require three or four months of careful mechanical treatment before the bones are brought into their natural relative position; as soon, however, as this is accomplished, the patient will be able to flex and extend the foot with the greatest freedom and without pain, and, with the boot and support I have before alluded to, will walk with great ease and comfort. That of the grave-digger was a most severe case of distortion; previous to the treatment he had in one foot no motion — in the other no available motion of the joint at all, and was ultimately compelled to relinquish his employment, the effort of walking but a short distance occasioning great pain. The moment the feet were restored, he possessed free motion in both feet. Three months, however, after treatment, without any assignable cause (for he suffered scarcely any pain, and none the latter part of the time), he was attacked with acute meningitis, which rendered it necessary to remove the apparatus. Leeches, blisters, and cold lotions, were applied, and doses of calomel given him every two hours: the mouth became affected in the course of forty-eight hours, from which time he slowly recovered. The convulsive twitching of the muscles, however, remained for a fortnight afterwards. I can attribute this casualty only to his good living, and leading an idle life. The boy was suffering neither mentally nor bodily: but he was in fact highly pleased of his prospect of cure. He left the Charity completely recovered. Had any unpleasant result followed, there is but little doubt that it would have been attributed to the operation, and any casualty occurring, which is common to all operations and treatment of every disease, would, as you must perceive, prejudice the Charity in its early existence. It will be necessary for the patient to wear a support for at least twelve months, or at least until the arch of the foot is maintained when subjected to the weight of the body. Let him never be without the support at night for some time, following the active treatment, as the more constantly and uninterruptedly the bones are kept in apposition the more speedy and certain will be the ultimate recovery. You cannot be too particular about this

point, as by any neglect either on the part of the attendant, or on that of the patient or friends, a relapse will certainly be the consequence.

I must now call your attention to those deformities which are considered to be of a compound nature, and which are derived from a union as it were of talipes equinus with either talipes varus or talipes valgus, and are designated by the respective terms of talipes equino-varus, or talipes equino-valgus. I do not myself see the necessity for multiplying terms; but as it has been done by others to distinguish the various forms of the deformity, it is perhaps as well to adhere to them. By talipes equino-varus will be understood an elevation of the heel from contraction of the gastrocnemius, and inversion of the foot from contraction of the anterior or posterior tibial, or both; the patient walking on the outer and inferior surface of the fifth metatarsal bone. In fact, I see no difference in the character of this deformity from varus, excepting in degree. Talipes varus being congenital and non-congenital; talipes equino-varus has this

Fig. 15.

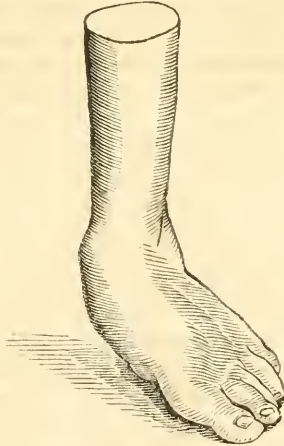


An illustration of talipes equino-varus in its less severe form.

distinction also — the same muscles are contracted. The same treatment is necessary, so that it is useless to enter more fully into the description of this deformity. Talipes equino-valgus, however, presents this difference — that in *true* talipes valgus you find no contraction of the gastrocnemius muscle in infants, although it becomes so from position; in talipes equino-valgus you have the contraction of

this muscle ; so that it consists in the elevation of the heel or contraction at right angles, combined with a sinking of the arch and more or less eversion of the foot ; you have the same anatomical condition of the bones of the foot : this deformity is non-congenital. The cause of talipes equino-valgus is irritation and disease of the brain or spinal chord, producing paralysis of the anterior and perhaps the posterior tibial muscles ; the cause is generally attributed to the irritation of teething. The heel is seldom elevated beyond a right angle ; the arch of the foot is gone, and the peronei (longus, brevis, and tertius,) as well as the common extensor, will be found contracted ; the anterior portion of the foot everted, and the patient walking on the inner edge of

Fig. 16.



An illustration of talipes equino-valgus.

the foot, but more especially on its anterior surface on the ball of the extremity of the great toe, producing, as the patient throws the weight of the body on the foot in walking, a great and constant strain on the internal lateral ligament, which at times is so weakened and elongated as almost to allow the astragalus to fall out of it, which, if the articular cavity admitted of it, would unquestionably take place : the external lateral ligaments become proportionably contracted, and offer more or less resistance to the restoration of the foot to its right position : here, as in the valgus, where this extreme condition of parts exists, the degree of obliquity of the astragalus renders the ankle capable of but very little motion ; most frequently you will find paralysis of the ante-

rior tibial muscle to exist. Occasionally, however, as in all cases where paralysis has been the primary cause, you find a partial restoration of the functions of the muscle; there will be also more or less atrophy of the limb, and a reduced nervous vitality of the skin, as well as other tissues. We now come to the

Treatment. — If there is decided contraction, and the foot cannot be completely adducted by the hand, you must have recourse to the division of the tendons, — the mode of doing which, and the precautions necessary to be observed, I have previously fully detailed to you. It will be better to divide the whole of the tendons at one operation, and, after the punctures are healed, to proceed slowly with the mechanical treatment; first directing your attention to the adduction of the foot, and extension of the new connecting matter of the divided tendons: after this is accomplished, proceed with the flexion of the foot, and as soon as it is brought into the flexed and adducted position, let the patient have a boot with a support attached on the outside of the leg, with a strap passing over the ankle, to hold the foot in position during the time the lateral ligaments are gaining strength: you will also require the raised cork in the sole to support the arch of the foot. If the originally paralysed muscles have recovered their power of action, you may anticipate a perfect restoration eventually, if proper attention be given to keeping the foot in position. If, on the contrary, paralysis of the anterior tibial muscle still exists, you can do no more than remove the deformity, and rest satisfied with the artificial support. The ligaments in this instance will contract, and hold the foot in the proper position, so that the patient will be enabled at times to walk tolerably well in a common boot. In a case I operated upon eighteen months since, of a young gentleman, ten years of age, paralysis of the anterior tibia muscle existed and still exists; there was an extreme relaxation, a looseness of the joint, especially on the internal side, appearing as if the internal lateral ligament was altogether absent. The peronei, the common extensor, and the tendo-Achilles were divided; which, as a matter of course, both at the time of the operation and for some time afterwards, increased the weakness. At the end of twelve months, by continued attention to position, the foot presented a natural appearance; all trace of deformity ceased to exist; and he was able to walk without any support, at the same time feeling no sense of weakness; in the after part of the day he wore a shoe or boot, from which he experienced no inconve-

nience. There can be no doubt but that if he were to omit the support altogether, the deformity would return, as the balance of the power could not be maintained except by artificial support: you cannot, therefore, pay too much attention to this point.

Although I have described *true talipes valgus* as existing without contraction of the gastrocnemius, and *talipes equinus valgus* as being thus distinguished from it, yet I must not have you regard this as an absolute rule, for in the most severe cases of *true talipes valgus*, where there is none or very little motion in the joint, the gastrocnemius has appeared to me to be slightly contracted, and the case detailed was so; not sufficiently, excepting in the case mentioned, to warrant a division of the tendon, but sufficiently so to prevent the full amount of flexion. Should you find it contracted sufficiently to prevent the foot being fixed beyond a right angle, I would advise division of the tendon; but in adult cases not until after the adduction of the foot is accomplished.

LECTURE V.

TALIPES CALCANEOS AND TALIPES CALCaneo-VALGUS.

At our last meeting I pointed out to you the character of *talipes valgus*; that it was both congenital and non-congenital; that it consisted in a sinking of the bones forming the arch of the foot, from a yielding of the ligaments and of the plantar fascia, together with the muscles of the sole. That both the longitudinal and transverse arches were gone, and that a perfectly flat position of the bones of the tarsus was the result, combined with an eversion of the anterior portion of the foot; this effect arising from the greater amount of muscular power being in the middle and outside of the foot. That the internal lateral ligament is elongated, as well as the calcaneo-scaphoid ligament. That the muscles in their action have a tendency to increase the malposition, in consequence of the firmness of the fulcrum upon which they act being to a great extent destroyed; that this applies to the muscles in the sole of the foot, as well as to those passing over and through it; that it was unaccompanied with paralysis and appeared to me to originate primarily in the yielding of the passive connecting media between

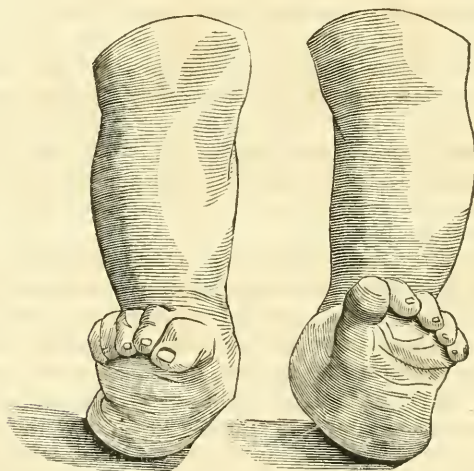
the tarsus and metatarsus. That in the congenital cases I regarded it as the result of position maintained during the embryotic existence up to the period of birth. That non-congenital cases are met with in persons of all ages, and that a general weakened constitutional condition is a predisposing cause, although the deformity was often attributed to much standing in one position, or to the effect of carrying heavy burdens. That in the most severe cases the motion of the joint is altogether interrupted, from the astragalus falling on its inner side and lying in an oblique lateral position in the articular cavity; the outer articular surface pressing on the articular surface of the fibula, the inner on the corresponding articular surface of the tibia; and to this I attribute the pain experienced by the patient in walking: that at times the patient would almost appear to touch the ground with the inner ankle; that at all times great lameness and difficulty in walking are the result, and that occasionally those suffering from this deformity have been obliged to abandon their ordinary occupation. That the muscles generally found contracted were the peronei and extensor communis digitorum, the peroneus longus et brevis everting the foot; the peroneus tertius and extensor communis raising the outer edge thereof. That the method I had adopted of dividing the peroneus longus and brevis consisted in passing a sharp-pointed knife between the tendons and the bone, with the flat surface of the knife to the tendons; afterwards turning the knife half round, depressing the handle, and with the sharp edge towards the tendons dividing them. That in dividing the common extensor you will pass the knife on the inner side beneath the whole at the same time, and divide them by one operation. That after the punctures were healed you would commence the extension and adduction, which being accomplished you would proceed with the flexion; and as soon as the foot was brought into position the arch of the foot should be supported with a cork sole with a support reaching from below the knee. That it was absolutely necessary to maintain the position uninterruptedly, night and day, for a longer or shorter period, until the foot could support the weight of the body without a return to the malposition unaided by any artificial support. That if the patient be allowed to use his foot previously to attaining this, a return of the deformity would be the inevitable result. I then drew your attention to the two kinds of deformities which were considered as a compound of those previously described, namely, that of contraction of the gastrocnemius muscle, combined with

either eversion or inversion of the foot, and which I designate by the respective terms of talipes equino-varus, and talipes equino-valgus. That I considered it an unnecessary multiplication of names, especially as regards talipes equino-varus, as both in varus and talipes-equino varus the causes are the same, the muscles contracted the same, the treatment the same, differing only in degree. That in talipes equino-valgus there is, however, a contraction of the gastrocnemius, which I did not consider to exist in true valgus, although at times in more severe cases there has appeared to be, and in one instance was, a contraction of that muscle. That the two deformities differed in their cause; the one arising from debility without any functional derangement in the muscles, or nerves supplying them; the other arising from irritation of the brain or spinal cord, thereby causing paralysis of the anterior tibial muscle; and that these causes were generally found to be the origin of these species of deformities. That the same treatment was to be adopted in both instances, but that in those cases where paralysis still existed, recourse must be had to continued mechanical support, both to sustain the arch of the foot, and also to prevent a recontraction of the muscles; but that after the ligaments had regained sufficient strength to support the weight of the body unassisted, the patient might be allowed to wear a common boot or shoe after the active duties of the day were over, and gave you an instance of this occurring in a patient in whom the greatest laxity of ligaments and the most extensive motion existed; yet by retaining the foot in position for twelve months the ligaments had recovered themselves sufficiently to enable the patient to adopt the course mentioned, that of leaving off the support in the after part of the day.

Talipes Calcaneus. — We come now to consider another species of deformity or distortion of the foot, viz. talipes calcaneus; so named from the posterior extremity of the os calcis pressing upon the ground in walking, the foot being kept in the flexed position unaccompanied with lateral distortion, or at least so slight as not to be considered as such. In talipes calcaneus, then, you have little or no malposition of the bones, the deformity being rather an extreme amount and permanent condition of one of the natural motions or positions of the foot, and this being the flexed position. In those cases I have enumerated, you have, it is true, the extreme instance of the natural position, but you have also more or less displacement of the bones themselves, and more or less alteration of the ligaments, they being either

contracted or elongated. In some cases of talipes equinus, however, you have very little displacement of the relative position of the bones ; and it is a circumstance worthy of notice, that in these two deformities, the one being directly the reverse of the other that they should correspond in this particular, viz. being each *an extreme of a natural position*, unaccompanied with any other derangement in the bones, &c. ; the one being the greatest amount of extension of the ankle-joint, *i. e.*, in its complete form ; the other the greatest amount of flexion. There is, however, this important difference, viz. in talipes equinus you most frequently find paralysis co-existing and originating from various causes, both local and general. But in talipes calcaneus we have but one cause, and that one arising during uterine existence, it being a congenital deformity. It consists, then, in the more or less complete flexion of the foot, unaccompanied with paralysis or loss of power in the gastrocnemius ; but the anterior tibial muscle is contracted, together with the extensor pollicis longus, the extensor communis and peroneus tertius ; in fact, the whole of the muscles whose tendons pass over the anterior surface of the ankle-joint ; and

Fig. 17.

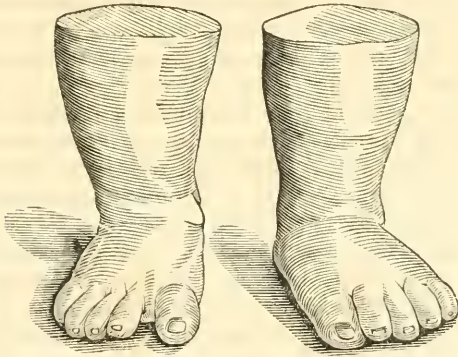


An illustration of talipes calcaneus, taken from the cast of a child five weeks old.

owing the integrity of the functions of the gastrocnemius and the muscles situated behind the joint, you have none, or scarcely any, deviation of either side, the patient walk-

ing on the posterior extremity of the os calcis. I have never yet met with the deformity in the adult, the case presenting themselves being in infants and young children, and it is perhaps the most rare deformity met with, at least we have hitherto found it so. You will generally be enabled to bring the foot by the hand to a right angle, and occasionally below it, but on removing the hand the contraction of the muscles immediately draws the foot up again, and maintains it so. There is no want of muscular development in infants, although this must undoubtedly occur if the deformity be allowed to continue. I imagine that cases which have not been treated in early life have been subse-

Fig. 18.



The above after five weeks of treatment, which consisted in the division of the anterior tibial and extensor proprius pollicis, extensor communis, and peroneus tertius; afterwards extending the feet by means of the splints mentioned.

quently relieved to a great extent by the effects of the weight of the body in walking, pressing up the heel and keeping the foot at right angles, and the gastrocnemius retaining its functions would assist during the efforts of walking; at least, this is the only reason I can assign for not having seen this deformity in the adult. It is unquestionably the most simple distortion to treat, at least by operation, which I should always recommend you to adopt, being comparatively painless, and after the division of the tendons the foot is most easily brought into an extended position. The plan I have adopted is the following: to pass in a small sharp-pointed knife on the *inner* side of the extensor communis, beneath the tendons of that muscle, and also that of the peroneus tertius, and to divide them; then to introduce the knife on

the *outside* of the anterior tibial and extensor pollicis tendons (which you will find raised from the joint); pass it inwardly (as it regards the leg) beneath them, turn the sharp edge of the knife to the tendons, and divide them; you will then avoid the risk of puncturing the anterior tibial artery, which, although it might be compressed easily, had better be avoided; at the end of three or four days apply a straight splint from below the knee to about the length of the foot below the extremity of the os calcis, having a hole cut in it to prevent pressure on the heel, and the whole being well padded and secured throughout to its full extent, above the ankle-joint, by means of strapping, first bandaging or supporting the foot by means of adhesive plaster. You then have full power to extend the foot, without fear of displacement of the splint, by passing a strip or strips of adhesive plaster over the anterior portion of the foot and passing it round the extremity of the splint: in this way, by keeping up the extension daily, which is done with the greatest possible facility, you will in a very short time, and without much, if any pain, bring the foot to its full extended position: after you have done so, it is as well to keep it in this position for a few days, when I would recommend you to remove the splint and allow the mother to apply the bandage over the splint night and morning, giving the child an opportunity to exercise the foot for an hour or more each time, and when the tendency to contraction is gone, leave off the splint altogether during the day, and allow the child to wear a boot well fitted, so that the support may be uniform to the foot and ankle. There is nothing more simple or more easily accomplished than the cure of this species of deformity, in the whole range of orthopædic treatment.

I have extended the foot in this way without operating, but after the removal of the splint for any length of time the contraction has returned, which I have not found to be the case after section of the tendons with ordinary care.

You will perceive that I have a great preference for tenotomy in all cases where contraction exists, whether infants at the earliest age, or late in life; and the preference arises — 1st, from the facility with which it is accomplished; 2dly, because it incurs comparatively no risk, and scarcely any inconvenience; 3dly, because you at once overcome the principal resistance, and render the after-treatment painless to the patient, and comparatively easy to the attendant, independently of which, the child is not subjected to such constant confinement of the limb as is absolutely necessary when you do not have recourse to any operation; and it

must be borne in mind, that the very confinement necessary to keep up constant stretching on the contracted muscles, at the same time renders those not contracted passive, and thus no opportunity is given for development, which alone can take place by exercise ; whereas, after you have overcome the resistance by means of the operation (which is shortly accomplished in infants), you can allow exercise to be taken for a certain time during the day, and this even in infants, must have a most beneficial influence ; for although the child cannot walk, yet the will is as active, and the various motions of the extremities are as numerous and frequent, or even more so, than at any period in after life. This exercise is of the greatest possible importance to the development of the infantile muscles. I operated on an infant about four months since for the deformity last mentioned ; and within a month from the time of the operation the splint was omitted during the whole of the day, and the child exercised the various motions of the joint with its natural facility, and from that time to the present no trace of recontraction has shown itself ; whereas, had not the tendon been divided, the foot must have been fixed perhaps for months, and the muscles of the limb below the knee kept very nearly, if not entirely, in a passive condition ; for although the child would instinctively direct its efforts to escape from the confined position, yet the motion must of necessity be so limited that little or no beneficial effect could be anticipated as regards muscular development.

Talipes calcaneo-valgus. — I must now draw your atten-

Fig. 19.



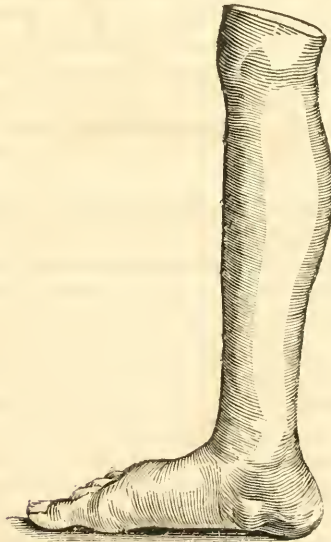
An illustration of the *talipes calcaneo-valgus*, in which may be observed the absence of the projection of the *os calcis*, and the great increase of the longitudinal arch, with the approximation of the little toe to the outer side of the *os calcis*.

tion to another species of deformity of the foot. It is a

compound of talipes calcaneus and talipes valgus; and is called talipes calcaneo-valgus; and although its name is derived from the above-mentioned variety, and that it is in some respect analogous to them, yet I shall endeavour to show you that it is totally different as to its cause in its results. By talipes calcaneo-valgus, then, you will understand, 1st, a falling of the posterior extremity of the os calcis (vide fig. 19); 2dly, an eversion of the whole of the anterior portion of the foot. The posterior extremity of the os calcis being approximated to the anterior and inferior portion of the foot; the length of the foot being diminished more or less, according to the time the patient has been afflicted with the deformity, and its severity: you have, then, the longitudinal arch of the foot increased, — the ligaments on the dorsum being more or less stretched and elongated, those of the sole, and the whole of the tissues, muscular and tendinous, contracted. It is non-congenital, and owes its origin to cerebral or spinal irritation, or disease producing paralysis, either of the gastrocnemius alone, or of the entire limb; upon recovery from which the gastrocnemius will be found very generally perfectly paralysed; and if you will direct your attention to this point, you will perceive at once the mode by which this deformity is caused. The os calcis, as you are aware, has inserted on its tubercle the gastrocnemius and plantaris muscles, by which its position is maintained, and by those muscles alone. If, then, this muscle loses its power, of course the os calcis can no longer maintain its position. It has also the strongest ligament of the sole, — the plantar fasciæ and muscles attached on its anterior inferior surface; so that these muscles and ligaments, losing the firm fulcrum upon which they act, the one contracts passively from its position; the others, by their natural healthy action, have a constant tendency to draw down the posterior extremity of the os calcis, whilst the anterior tibial, together with the common extensor and extensor pollices, having no opposing power, draw up the foot altogether, the peronei everting it; and thus the patient is thrown almost entirely on the posterior extremity of the os calcis and inner ankle, from the increased length occasioned by the constant stretching of the internal lateral ligament; and you will find the foot, as in other instances mentioned, especially of talipes equino valgus, only much more severe, with an extreme amount of lateral motion, and constant weakness, and instability of the articulation. It is frequently combined with paralysis of the whole limb, the contracted mus-

cles excepted, and of course atrophy to a greater or less extent in all instances. In some cases you will find the gastrocnemius has, to a limited extent, recovered its power of motion, and no concomitant paralysis; but this is the exception, and of very rare occurrence. I have, however, met with it in a few instances. There is also the same reduced condition of the natural tone, and liability from slight causes to wounds or chilblains, the limb being incapable of maintaining its proper temperature, even during the summer months; in fact, you have the usual concomitants of a paralytic limb. The inconvenience occasioned by it is very great, as the patient possesses scarcely so useful a limb as a wooden leg would afford, as with the wooden one he would at least possess firmness, whilst with this deformity, unaided by artificial support, he has none whatever. The weakness and pain experienced in walking from the relaxed condition of the ligaments in severe cases, are very great, and the lameness very considerable, as there is no available motion in the ankle-joint. In some

Fig. 20.



cases you will find the weight of the body thrown entirely on the posterior surface of the os calcis, and the front part of the foot completely off the ground, the leg presenting a straight line throughout its entire length posteriorly; when,

on feeling for the tendo-Achilles, you will find, as it were, a small cord, lying perfectly loose behind the ankle-joint. This, I think, can scarcely be called structural *lengthening* of the muscles, although there is a degenerated condition

Fig. 21.



An illustration of talipes calcaneo-valgus, in which the gastrocnemius had recovered itself, occurring when the patient was two and a half years old, without any previous illness. The child was put to bed in apparently perfect health, and when taken up in the morning was found to have lost the use of both lower extremities, which continued for three or four days, when the opposite extremity recovered its lost power. The leg represented in fig. 20 did not recover motion for three weeks; at the end of that time, however, the child could again walk, but with considerable lameness, which continued to the time of my seeing her, although the usual means, viz. embrocations, friction, &c. had been freely used.

The tendons of the extensor communis, peroneis tertius, brevis, and longus muscles, were divided, and extension and adduction maintained by means of Scarpa's shoe for ten weeks, when the foot was restored to its natural form and position, as represented in fig. 21, and the patient could flex and extend it at will, without any lateral deviation. She wears, however, a boot, with an upright support attached, to prevent a return of the deformity, while the ligaments are gaining strength in their normal position.

of the muscular fibre, which degenerated condition is consequent upon the paralysis and constant elongation of the muscle to its full natural extent. And this appears to me

to be an argument against structural shortening ; for the greatest amount of contraction met with does not exceed the amount of lengthening which the muscle admits of when paralysed from disease either at the origin or in the course of the nerves supplying it. Where, then, I would ask, is the *innate* muscular action ? But to return : —

In these cases, as you must have anticipated, when paralysis of the gastrocnemius is present, our treatment can be only palliative ; we can remove deformity, but we cannot give power. The first thing to be done is to endeavour to extend the foot, and to force the os calcis up again into its longitudinal position, which you will accomplish by dividing the contracted muscles, and extending the foot precisely as in talipes calcaneus, keeping up, however, a greater and more permanent amount of pressure on the dorsum, with or without the pad beneath the os calcis. It will assist you if you divide also the plantar fascia, and as much of the muscles in the sole as you can easily with safety do ; you will then keep up extension of the joint, to enable you the more effectually to increase the distance between the os calcis and the anterior extremity of the metatarsal bones, and in this way gradually raise the posterior extremity of the os calcis, which you will find is almost perpendicular. You must proceed slowly, and with care, for the same reasons that I pointed out to you in a former lecture, when the deformity was connected with paralysis ; and after you have restored the position of the foot, you will order a boot and iron, with a stop-joint to prevent flexion, thus always keeping the foot at a right angle, giving the patient the opportunity of extending to a greater extent in the movement occasioned by walking on uneven surfaces, or down an inclined plane, which will assist in keeping the os calcis in position.

There can be no prospect of the patient ever being able to do without the support, and you will do well to prepare him for this, by informing him that he must wear it for life, or until a remedy or cure is discovered for paralysis which has occurred in infancy, and been of some years' standing. They will, however, walk with comparative ease and comfort, and be enabled to undergo almost, if not quite, as much walking exercise, as persons in general, but of course with more or less lameness. In those cases where there is no paralysis, although it had formerly existed, you will, with attention to the position of the foot, be enabled to perfect a cure, and in course of time the patient will be enabled to walk without any assistance, and possess as useful a

limb, to all intents and purposes, as its fellow which has not suffered. You must, however, adopt here, as in other instances, the greatest care and perseverance, as the cure depends on the position of the bones and ligaments being constantly maintained during the time exercise is allowed, and until all trace and tendency for the foot to assume its malposition has ceased. I may mention to you a mode of treatment which has been adopted, and which we once tried at this Institution, viz. the removal of a portion of the tendo-Achilles, say half an inch or an inch, placing the two remaining ends in contact, and keeping them so for a length of time. I can imagine it possible to improve a patient much in this way, provided the two ends are kept in contact, or nearly so, for a length of time: but this is very difficult to accomplish, unless you have the patient entirely under your control, which you can scarcely expect to have as an out-patient, and the object to be gained is not sufficiently important for us to keep them as in-patients during the period necessarily required, because, should we succeed so far as to give a firm natural support to the os calcis by this method, we could not give power, and even then recourse must be had to artificial support; and I do not see in what way a patient would be benefitted, who in either case, must use the same means, or nearly so during his life. In the case I have alluded to, I removed about two-thirds of an inch of the tendon, by making an incision directly over it, and exposing the sheath, laying it open, and with a hook raising the tendon; then with a knife removing the above-mentioned portion; but, being an out-patient, he was necessarily obliged to be brought to the Institution, and although every care was taken that could be, under such circumstances, yet the foot was scarcely ever found in the position in which it was placed, in consequence of the constant moving occasioned by his being brought to the Charity. I do not, therefore, consider it a fair trial, but for the reason stated it is not an operation I should recommend, as you may obtain all the ends desired or expected without it.

I have now pointed out the leading deformities of the ankle-joint; but before I conclude this subject, I must draw your attention to a condition of the joint I have met with, which exists without any visible deformity, but which, nevertheless, is as serious an inconvenience to the patient as some already detailed, namely a fixed position of the ankle-joint at right angles, occasioned by a contraction or rigidity of the whole of the muscles whose tendons surround the joint; the joint, as far as motion is concerned, appear-

ing ankylosed. It arises from inflammation in, or in the neighbourhood of the joint, and, as in other instances already mentioned, owes its origin to the instinctive efforts constantly in exercise by the patient to relieve himself from, or to prevent an increase of pain; there being no disease in the nerves or muscles themselves. The position at right angles, is however, the most rare, as generally, when disease in or about the joint is a cause of contraction, talipes equinus, or talipes equino-varus, is the result; either of these deformities appears to leave, and in fact does leave, the synovial membrane of the joint more free, and less subjected to pressure, than the position at right angles. This condition, then, although unaccompanied with deformity, is, as you must perceive, a very serious inconvenience, and occasions great lameness; as during the act of progression, immediately the opposite extremity is carried beyond the perpendicular position of the body, the patient is thrown on the anterior extremity of the metatarsal bones, and the body becomes raised beyond the natural extent; and again, in bringing the foot thus affected forwards, the posterior extremity of the heel only touches the ground at first, and the sole of the foot falls more or less abruptly, according to the rapidity with which the patient walks. The consequence is, that constant lameness and great fatigue, always result, and occasionally the foundation is laid for lateral curvature of the spine, from the increased mobility kept up in the spinal column.

A case of a gentleman, 20 years of age, occurred to me some time since. He consulted me for what he imagined to be a simple contraction of the gastrocnemius, and also for lateral curvature of the spine, which, however, was slight. Upon examination, I found that it was impossible to flex the foot beyond a right angle, and recommended division of the tendon; which was assented to. I accordingly divided the tendon, and proceeded in the usual manner to flex the joint. As the flexion proceeded, the foot everted (a circumstance I pointed out to you, when speaking of talipes equinus, occasionally happened), and, upon examination, the peronei and common extensor were exceedingly rigid and tense, as also the anterior tibial tendon. I proposed and advised a division of these tendons, which was assented to. After the punctures had healed I directed the foot should be flexed and extended alternately night and morning, and in this way succeeded in obtaining free motion, which was also accompanied with voluntary power; and the patient perfectly recovered without the aid of artificial support. The

curvature of the spine was afterwards cured by means I shall have occasion to point out to you when we come to speak on that subject.

This case originated, when the patient was six years old, from abscesses around the joint, but which had not affected the integrity of the joint itself, and was occasioned by the constantly maintained position, every muscle having been directed to assist in preventing motion; and this being continued for two or three years, resulted in the condition mentioned. I have since seen three cases in younger subjects, but it is rare, and will require great caution in forming your diagnosis.

With this, gentlemen, I conclude the Deformities of the Feet; and you cannot have failed to observe, that each of them is, at its origin, and in its less severe form, nothing more than a permanent position of one of the natural motions of the joint, whether it is congenital or non-congenital, whether attended with paralysis or without paralysis; and this circumstance alone renders it the more unaccountable and astonishing that the attention of the profession was not earlier attracted to their true character, and that the circumstances which induced Delpech to make this great and novel experiment of remedying them upon proper scientific principles, namely, the union of the tendo-Achilles and fracture of the patella, were unobserved until so recent a period, for many opportunities must have presented themselves in the dissecting-room for the study of their morbid anatomy.

In the first deformity I drew your attention to, namely, talipes equinus, there is at its onset, and during its progress nothing more than a greater or less extension of the joint, and this amount of extension not exceeding the natural and healthy position, which, during the varied exercise to which every human being is subjected, is constantly taking place; and even the complete elevation of the heel can also be effected voluntarily, as may be seen on the boards of the Opera; for no talipes equinus can be more complete than the extreme extension the opera-dancers are enabled to effect, and to maintain for some length of time.

In talipes varus, the next considered, there is in its simplest form but the inverted position, which can be accomplished at will by any individual; and the malposition of the bones, in severe adult cases, with the contraction of tissues, is occasioned, as I have shown you, by the weight of the body constantly stretching certain ligaments, and in this manner adding to the original position, by more or less separating the bones from their normal articulating sur-

faces — at least in part, never altogether; and it is a remarkable fact, that in this, the most severe deformity in appearance, and occurring perhaps at an early period of uterine existence, the bones are formed and grow in their natural relative proportions, and with their natural healthy articulating surfaces; although with a natural inference a portion of these articulating surfaces have never been in actual contact: thus showing that the *nisus formativus* remains uninterrupted, and giving us a clue to its real character and origin.

Again, in *talipes valgus*, you have also the eversion which is to be accomplished by the will at pleasure. The flattening of the arches of the foot, arising also from mechanical causes, and a supposed debility of the passive attachment of the bones, and the two deformities arising from the first, in combination with either of those last mentioned, can be at all times occasioned by the effort of the will.

The last, viz. *talipes calcaneus*, being also a flexed position, and one constantly occurring in the varied motions exercised in daily life, and yet this state of things being permanent, becomes a deformity, of course aggravated from various attendant circumstances and causes mentioned. And what deformity can we meet with greater than that which is daily witnessed in the positions assumed by itinerant mountebanks, who have been accustomed from early infancy to a stretching of almost every ligament of the body?

Having now pointed out to you the true character of the deformities of the foot, I must just draw your attention to the congenital deformities. These consist of *talipes varus*, *talipes valgus*, and *talipes calcaneus*. I have never met with *talipes equinus*. You will recollect I stated that, in my opinion, it was position, and position alone, which caused these malpositions (or rather the permanent extreme natural position, for this is its real character) during uterine existence; and if you observe the character of these three congenital deformities, I think you will have little difficulty in reconciling the possibility, if not the probability, of this being the case. Take the first mentioned, *talipes varus*. There are many positions in which the extremities of the child may be kept in utero, which would adapt it better to the cavity of the uterus, provided the feet were inverted; and it so happens that by far the greater number of congenital cases consist of double varus; and where it does not consist of double varus, nothing is more easy to account

for than one or other extremity being so placed, that the foot should grow in that position, whilst its fellow may be free and unconfined. Then, if you refer to congenital varus, this also may be easily imagined — that the extremities or extremity may be so situated that the flat surface of the feet press more or less on the walls of the uterus; if not constantly, sufficiently to influence the position of them during the growth of the bones and ligaments; and be it remembered that it is only the ligaments and muscles that we find affected, the bones retaining, in either of the three forms, their natural proportions and relative size, and it must be evident that it would not require any force, but merely a constant position, to produce this effect,—at least it is so to my mind.

Then, again, take talipes calcaneus: this also is a position, that may as easily be imagined to be constantly effected, according to the position in which the extremities lie; and if they are so situated that the anterior portion of the sole of the foot presses more or less on the walls of the uterus, of course the flexed position is the one it would assume, and that without any difficulty or resistance; as, if we suppose, during the motions of the child, the position of the feet may be more or less altered as it regards the extreme amount of flexion, yet if, after these active efforts have ceased, the feet reassume this position, the gastrocnemius remaining passive, which it would do, of course the greatest amount of flexion would most easily take place, and thus become permanent, the flexors growing in the contracted condition.

The same remarks apply to each of the congenital deformities which we meet with, without malformation of the parts. I stated also to you that it was my opinion no structural shortening took place, and that there was no evidence of any morbid condition of the muscle or muscles. Now it must be remembered, that although the bones grow in an extreme position, yet, as I have before observed, they are perfectly formed, and that the articular surfaces also are in every respect perfect: so that thus far a malposition does not interfere with the *nisus formativus*. Why should it do so in the muscles or tendons? To me, the fact of the contraction of the cicatrix drawing together the two ends of the tendons, in the case I mentioned to you in my first lecture, the natural position of the foot being maintained, and the natural motion of the joint having been exercised by the little patient previous to its death, is conclusive as it regards the idea of structural shortening. What evidence have we, then, of a spasmodic condition of the muscles contracted?

Do they, during the exercise of volition, whether in infants or adults, present that peculiar irregular action which is so conspicuous, and, I may say, characteristic, of what we call spasm? Certainly not. The motions are as well and regularly performed in the malposition as in the natural position, so far as the contracted muscles will admit. And many cases may be seen amongst our out-patients, in whom the deformity has been removed, where the little patients exercise every motion of the foot as perfectly and with as much facility as a child who has not thus suffered. This could not be, if there was that state of muscle called spasmodic, as in these cases (non-congenital spasmodic affections), of which we have had several, we know of no remedy that has successfully been applied; so that it does not appear there is any want of development, any diseased condition of the brain or nerves, nor any unhealthy condition of the functions of the muscles, unless the simple contraction be regarded as such. Now you must also bear in mind that the muscles which are not contracted are not in any way affected beyond their being kept constantly drawn out, and from the position of the feet or foot being constant, also prevented from contracting on themselves; but the moment the resistance is overcome you will find their power of contracting as perfect, whether in infants or adults, but more evidently, in infants, as if their full amount of power had constantly been used. And you have only to walk up-stairs, and you will be enabled to satisfy yourselves of this fact. So that these circumstances—I may say facts—combined, lead me to the conclusion that it is to the position that these deformities owe their origin. I have never, as I have told you, met *talipes equinus congenital*,—I mean the simple elevation of the heel: this also confirms me in my opinion, as I cannot imagine how this deformity could be caused by position, for I can perceive no way in which the extremities of a child could be placed or formed in utero so as to keep the heel up, without any other deformity or malposition being produced; whereas the three deformities mentioned may each of them be assumed to be placed easily in the position in which we find them.

With regard to the non-congenital deformities of the feet, you have, as I have had occasion frequently to observe, paralysis of one or more muscles, and a spasmodic affection of one or more of them; occasionally of the whole voluntary muscular system. When it is combined with paralysis, I have also stated that no known remedy has been discovered, if it has been of long standing, and that we can only remove

the deformity, and rest satisfied with artificial support ; that the limb is always in an atrophied condition, and possesses that lifeless flabby state which is so peculiar to the paralytic condition ; and as we know but little of the pathology of the nerves, I shall not waste either your time or my own by speculation or theory. Suffice it to say, that paralysis exists, and occasionally of both lower extremities, with contraction of one or more muscles, producing either of the deformities before mentioned ; frequently varus of one foot, valgus or equino-valgus, of the other ; the patient possessing the smallest possible amount of motion in the toes. And of course, if complete paralysis exists, you have no contraction of the knees, the limb lying in any position in which it may be placed, and appearing more like a foreign body than the living extremity, and, with the exception of the ligaments by which it is alone held, perfectly passive ; if not complete, the knees will also be found contracted, although there may be no available motion. You will occasionally find slight motion in one or other of the extensors of the leg, but not sufficient to be of the slightest use. There is always, however, as far as my present experience goes, more or less available power in the flexors and extensors of the thigh, and from this fortunate circumstance you will be enabled, after you have removed deformity or contraction of the feet, to place the patient in a much better condition—I may say happier condition—compared to that which he has been previously obliged to endure.

About twelve months since, a patient from the country called upon me, and with great difficulty swung himself along between two crutches ; his lower extremities being contracted and paralysed, were perfectly useless ; in fact, he could not move from the chair without assistance to raise him on his crutches. I divided the contracted muscles, and placed his feet and knees in their normal position, when, with upright supports attached to his boots, with stop-joints at the knee, he could rise from his chair, and, with the assistance of two-sticks, walk ; this he was enabled to do from the voluntary power he possessed in the flexors and extensors of the thighs. Since his return home he has been enabled to walk in this way about his farm, to superintend his business, whereas previously he was a complete prisoner, presenting a most miserable and pitiable appearance. The cast before you will illustrate the foregoing case most clearly.

In the case from which the cast was taken, the boy had never left his home or room except by being carried. On

removing the contraction, and restoring the natural position, he also by the same means is enabled to take daily exercise with the assistance of two sticks ; so that you can confer an

Fig. 22.

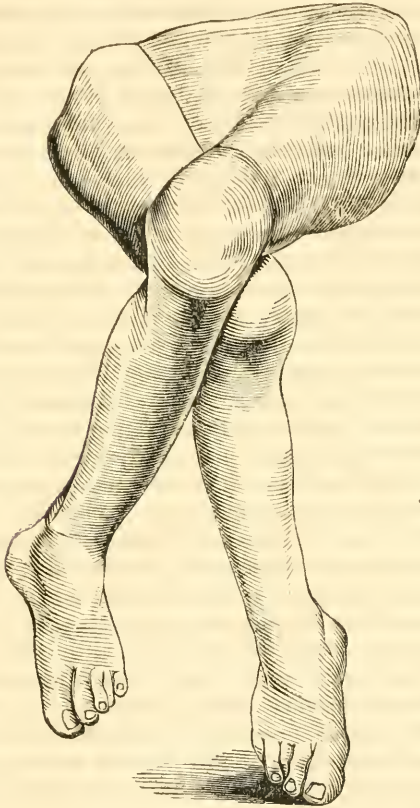


Diagram illustrating the paralytic condition of both lower extremities, which occurred in infancy from dentition. The flexors of the knees and gastrocnemii were contracted, the extensors of the knees and flexors of the feet perfectly paralysed.

immense amount of benefit in these apparently hopeless cases. Of course, as the deformities will consist of one or other of those I have endeavoured to explain to you, the treatment will be the same as that which is consistent with the nature of the case, and the peculiar form it may assume.

The spasmodic contractions are the most painful and difficult to treat, for although the deformity and contraction may be removed, yet we have hitherto been, and are at

present, ignorant of any means of remedying the spasmodic condition of the muscles ; and although by division of the tendons, and during the time the uniting medium is soft and yielding, you can easily hold the foot in any position, yet the cause exists, and the patient is unable to control his muscles. As soon as the uniting medium becomes consolidated, the same irregular action is brought into operation. and support the limb by any method you may please to adopt, you cannot remove the cause or the effect. You will, however, even here, improve the condition of the limb with great care ; but I would never advise recourse being had to the operation, if the foot or other articulation can be brought into position by the efforts of the hand alone ; but if by such continued efforts you are enabled to restore the natural position of the foot, then divide the muscles, which, notwithstanding their spasmodic state, are contracted ; and after the removal of the contraction, support the limb, and keep it as much as possible in a fixed position. I know of no cases that are more troublesome than these. It is a curious fact, that in these cases, where every muscle is affected, those of speech and deglutition as well, the intellects are perfect, although apparently weak, as the cause must exist in the brain or its membranes as well as in the spinal cord itself. The involuntary muscles are not in the slightest degree affected. The cause assigned as in most other non-congenital cases, is generally dentition or cerebral irritation, and you will frequently find talipes valgus of the one foot, varus of the other ; never, however, in their more severe forms, as the opponent muscles, although possessing less power, and thereby admitting of the malposition are also in an active spasmodic state, and prevent the foot assuming the more severe malposition. This condition is said to be congenital. I have never seen a case in an infant, and although the parents assert that such is the case, I shall not be satisfied until I see it, as I think it most improbable, except in hydrocephalic congenital states ; but even here I have not yet seen it. In the paralytic also you will find one foot affected with talipes varus, the other with valgus, or calcaneo-valgus ; in fact in either of the deformities I have mentioned, you will, in the spasmodic cases, which affect the whole of the muscles of the body, find contraction, either permanent or temporary, of the knees, and if not permanent, they will invariably be found in the flexed position on any attempt to exercise them on the part of the patient. The thighs will also be found adducted, and occasionally more or less contracted, in the flexed posi-

tion; the pronators and flexors of the hand and arm preponderating in power, so that the patient can exercise no steady well-directed movement, nor even continue the position in which the hand or leg may happen to be placed; as for instance, in the attempt to hold any thing in the hand, after having grasped the object, the hand will suddenly open with an irresistible impulse; nor has the patient any power to prevent this occurring.

It is clear, therefore, gentlemen, that we are in total ignorance of any complete and successful remedy for these cases; it is therefore useless to enter more into detail, as any thing that could be further advanced would be mere speculative theory. Galvanism has, in some cases of the less severe kind, been attended with partial success; but I much doubt if any positive beneficial results have eventually been obtained. You can, therefore, only place the joints in the relative position, and keep them in that position constantly, if the feelings of the patient will admit of it, but occasionally, from the violent spasmodic action of the muscles, you will find it necessary to intermit the treatment.

LECTURE VI.

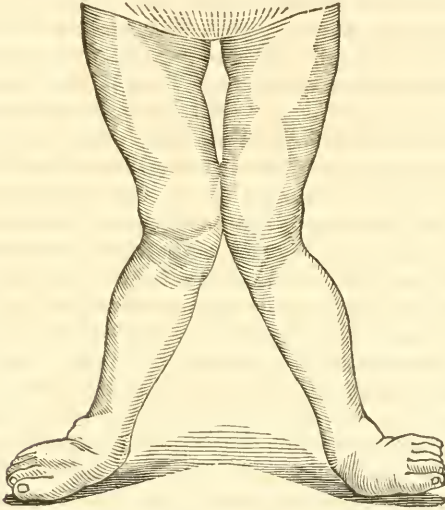
DEFORMITIES OF THE KNEE-JOINT — GENU VALGUM OR KNOCK-KNEE — GENU VALGUM WITH OUTWARD INCLINATION OF THE OPPOSITE KNEE — GENU VALGUM WITH CURVATURE OF THE BONES.

TO-DAY, gentlemen, we shall proceed to the consideration of the deformities, or malposition, to which the knee-joint is liable; the first or most simple form of which is that known by the name of genu-valgum, or knock-knee. This deformity is met with at all ages, from infancy to maturity, but rarely, if ever, in the prime or in the decline of life — at least not singly. It consists in a relaxation and elongation of the internal lateral ligament, and the crucial ligaments must also yield more or less; for in the healthy or normal condition of the joint these ligaments admit of the smallest possible amount of lateral motion. This appears to be the primary condition; and if you will direct your attention to the position of the joint, and observe that it is at a distance from the point or points of pressure in walking or standing, you will easily perceive that if the superin-

cumbent weight of the body is thrown in any but a perfectly straight direction, with regard to the axis of the joint, if the tibia on which the femur rests is in an oblique lateral direction instead of a perfectly horizontal one, corresponding with the articular surfaces of the condyles of the femur, that this bone must press, in walking or standing, in an indirect and abnormal position, producing thus mechanically an increase of the deformity, of whatever kind it may chance to be ; and when the foot is felt to incline outwardly, and the knees commence to touch each other, the malposition, as a rule, becomes daily increased in proportion to the extent at which the feet are separated from each other ; the greater the distance, according to a principle in mathematics, the more powerful will be the effects of pressure occasioned by the weight of the body, and the more rapid the increase of the deformity. The deformity is non-congenital — at least, I have never seen a congenital case, nor can I imagine how it could occur, provided we admit that congenital distortions arise from malposition in utero. The general cause is debility, and the specific causes the effects of dentition, the various eruptive diseases to which all children are liable, also whooping-cough (in children). In youth, the cause generally assigned is carrying heavy weights, or standing for hours in one position ; but although these are perhaps the immediate causes, general debility is the primary or remote one : for in whatever circumstances of life we meet with it — and it occurs in all, but more especially in the lower class — an unhealthy constitution generally exists, or has done, during its early stage. It is by far the most common deformity met with, excepting rachitic curvature of the bones, with which it is frequently combined, and occurs, as I have said, at all ages up to the adult stage. It exists alone, but very frequently, nay, it almost invariably, will be found combined with the tibia and fibula, and occasionally the femur also, thus showing the general state of the patient's constitution : occasionally it is single, or confined to one of the knee-joints ; more frequently it is double, in which both are affected, and generally one more severely than the other. At other times it is combined with outward inclination of the other knee-joint, thus giving the patient a most curious appearance in walking of one joint running after the other, the two joints forming an angle more or less acute. It is very frequently combined with spurious valgus, which owes its origin to the oblique position of the articular cavity of the ankle-joint, occasioning a constant stretching and consequent yielding of the deltoid, or internal lateral

ligament — the pressure being exercised on the inner portion of the transverse arch of the foot: the ligaments connecting the arch, (and which I mentioned to you when speaking of *talipes valgus*), also stretch, and allow it to sink, and then to form a flat foot, (Fig. 23.) In the early stage, then, you have this yielding or debility of the ligaments of

Fig. 23.



An illustration of knock-knees, taken from a child aged 6 years, in which the eversion and flattening of the feet was most severe, as observed.

the knee unattended with any additional obstacles; as the deformity continues, you will find the biceps, flexor femoris, from being constantly somewhat shortened, offer more or less resistance, which resistance becomes proportionably increased, according to the length of time it has existed, on the one hand; the state of health of the patient on the other: so that even in children you will find this muscle, together with the fascia lata, to which the vastus externus is attached, exceedingly rigid and tense upon any attempt to place the leg forcibly in a straight line; the whole of the deformity existing independently of, and unaccompanied with any disease in the articulation, ligaments, or muscles attached; unless, indeed, debility be considered as a disease. You frequently have, also, the large tumid abdomen, indicating an unhealthy state of the secretions, and symptoms of mesenteric disease. When the deformity exists to

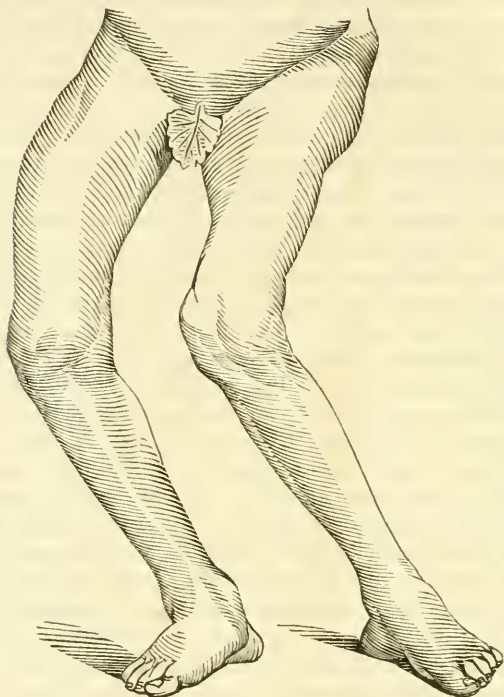
any extent, the internal condyle of the femur pressing much inwardly, the leg presents an unsightly appearance, because the gastrocnemius does not follow the position altogether, but recedes from the tibia and femur on the internal side, and passes in a more direct line to its origin, thus giving the internal condyle of the femur an appearance of increased size, and more full development than is natural. This effect is not, I believe, actually produced. I have been consulted, from this very circumstance, by parents whose children had this deformity. They imagined that an actual enlargement had taken place, whereas the appearance arose from the cause mentioned, and from the children having grown rapidly, with a diminished development of the muscular system generally. There is also an enlargement of the tubercle of the tibia frequently met with, and occasionally to a great extent, giving it the appearance of an exostosis, and forming quite a sharp point at its extremity, as if protruding from the skin, and almost leading to the supposition that a separation of the epiphysis had taken place, which I cannot imagine actually to occur; nor can I divine the cause; I only know that it is so, and that this also adds to the deformed appearance, and frequently occasions more anxiety to the patient than the deformity itself. It is not, however, of any moment, only requiring to be protected from pressure during the treatment; for I need not tell you that a spicula of bone would, with a very small amount of pressure, occasion a wound in the skin. The tibia and fibula will be found conjointly curved, with this affection, outwards, forwards, or inwards; very frequently the last. The tibia appears perfectly straight in its two upper thirds, and then diverges outwardly, so that when the knees are brought into their proper position the feet will remain two inches, or more, apart. A child thus affected, excepting only on the first onset, presents a very awkward appearance, and walks in a most irregular and unsteady manner of necessity, as, from the weakness and relaxed condition of the ligaments of the knee and ankle-joints, he possesses no steady support or fulcrum on which the moving powers can act; and instead of the leg being planted firmly on the ground the moment that it is brought forward, and placed in the position in which the extensors and flexors could act upon it, during the effort made to progress, and when the weight of the body is thrown upon it, the joint, or joints, yield more or less, according to the severity of the deformity, and thus occasion the irregular and unsteady motion of which I spoke; for at no time are the joints kept in their proper

position, or restrained with their natural, healthy firmness ; added to which, when the deformity is severe, one knee overlaps the other, and encloses it at each step taken — the only method the patient possesses of walking, the feet being too far apart to allow of the knees being brought into a parallel position : the consequence is, that the child will be constantly falling down, or tumbling about, and that he suffers additionally in health from the inability to take proper exercise without experiencing pain and great inconvenience. You must be well aware that it requires but little irritation or annoyance, constantly kept up, to interfere with the health of a child. This irregularity of movement keeps up an undue and often-times very considerable motion in the spinal column ; and when the affection is confined to one extremity you will occasionally find, as I mentioned to you when speaking of deformities of the feet, a tendency to lateral curvature, and very frequently the foundation is laid of spinal deformity ; as, when the ligaments of the spine are thus kept constantly in motion, — I mean an increased motion, producing elongation, — the spine will yield in any position, which, from whatever cause, may be longer maintained than any other ; for it cannot be expected that they can, when thus kept constantly in motion, acquire that degree of solidity and consolidation necessary to hold the spine and muscles in the erect position. Occasionally I have found talipes equino-valgus to exist, arising from paralysis of the anterior tibial muscle, from irritation, or disease of the brain or spinal column, resulting, in addition to the previous deformity : this is, of course, a much more serious condition than either of those before mentioned, oftentimes involving the necessity of the patient wearing support for life.

I mentioned to you that it is combined with outward inclination of the opposite knee ; a case of which, in the adult, is now in the Charity, and of whom this is the cast. (Figs. 24 and 25.) This also occasions, at times, increased motion in the spinal column. As the body cannot be kept in an erect position, except at the cost of the spinal column — for you observe that in consequence of the angle of the knees conjointly, the pelvis will be at times, in an oblique position, and if the spinal column maintained itself perpendicularly the whole of the upper portion of the body would be on one side, or hanging over, a position which would render it difficult for the patient to take exercise, or continued exercise ; whereas, by the yielding of the spine, an erect position is maintained, although the body presents a series of angles more or less acute, and of course in-

creased deformity. This outward inclination of the knee-joint rarely occurs in this affection, except in combination with curvature of the tibia itself, as may be easily seen if you cover the upper part of the thigh, and leave only

Fig. 24.

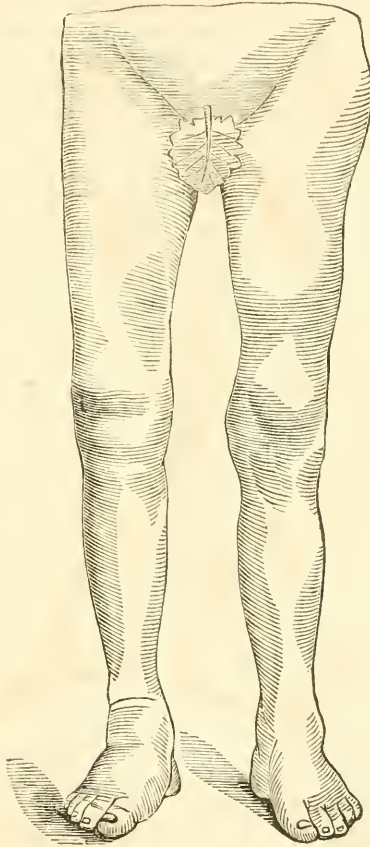


An illustration of knock-knee of one leg, and outward inclination of the other, taken from a patient aged 18. — Fig. 25 is the same after treatment. It must be observed, however, that the outward inclination is only removed during the time the instrument is on, an interspace existing between the internal condyle and head of the tibia, showing that the deformity in that leg is owing to a curvature in the bones altering the relative position of the articular surfaces.

the leg below the knee uncovered, when the tibia will be found to have deviated more or less from its straight condition. The foot will be, however, with this, somewhat displaced, generally everted, from the articular cavity of the ankle being out of its proper position, the astragalus lying obliquely in the cavity. In this case the whole foot becomes altered in position, without any change in the re-

lative position of the bones or ligaments themselves, the astragalus alone being displaced. This applies more especially to young children; as in strong boys, or young

Fig. 25.

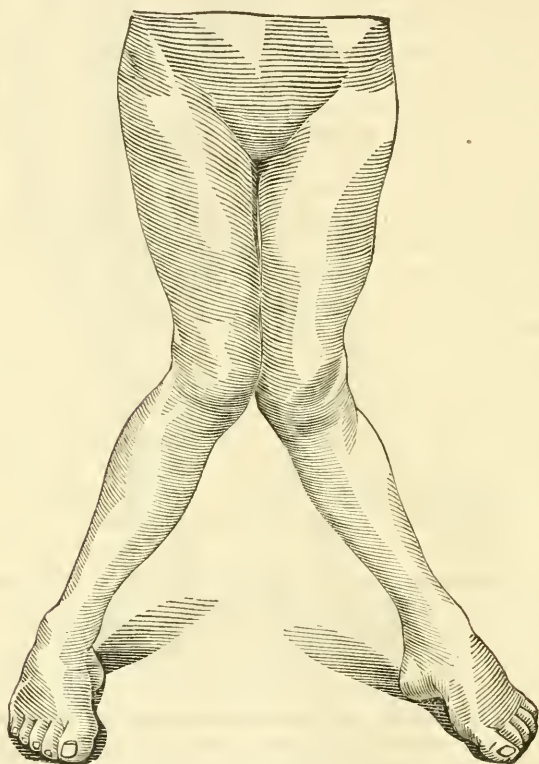


men, you will find just the reverse, from the power exercised by the muscles to prevent this alteration in the position of the astragalus.

The foregoing observations apply principally to young children. This deformity arises, then, at any period during the growth of the individual, and after infancy will be found to occur between the ages of ten and eighteen. It comes on gradually and imperceptibly, without any illness or apparent loss of strength; and the first thing that attracts

the patient's attention to it is the knees knocking or rubbing the one against the other: as it proceeds, a weakness is experienced in the joint, more especially on the inner side, which seems to be occasioned by the stretching of the internal lateral and crucial ligaments. The feet are then noticed to diverge from each other, and very frequently to turn, in presenting the appearance of slight talipes varus, (Fig. 26.) This position, however, is only present when the patient is walking or standing, and ceases when the legs are not exercised. You will find, upon examination,

Fig. 26.



An illustration of knock-knees, taken from a patient aged 18 years, in which the inversion of the feet, resembling slight talipes varus, is most apparent.

that there is, however, a greater amount of lateral motion in the ankle-joint than is natural, and that the internal lateral or deltoid ligaments is somewhat stretched. You will

rarely find talipes valgus between the ages of 10 and 18, as a consequence of the deformity, owing, I imagine, to the general health being stronger than in the young subject, and to the greater power and tone of the muscles generally, which, by their action, are enabled to protect the ligaments from so great an amount of pressure, and consequent stretching; whereas in children thus affected very little assistance can be expected from this source, inasmuch as general debility to a much greater extent is constantly present, allowing of the attachments of the bones and joints to yield from the slight causes.

You will never meet with curvature of the bones combined, unless that curvature has arisen during the earlier period of life, the bones presenting and possessing their natural and normal length, size, and form; but you will be struck in these cases, more particularly, with the apparent enlargement of the internal condyle of the femur which I mentioned to you, and which is more striking in youth than in childhood, from the general outline being as a matter of course more clearly defined, and also from the gastrocnemius, from the change in the relative position in the bones, leaving as it were, the internal condyle, and going direct to its origin; the question then arises, what is the change that takes place, causing the bones thus to alter their position? The objects who present themselves are generally those whose occupations require them to be for many hours in a standing position, as a compositor for instance, or those who are obliged to carry heavy weights, and to undergo much bodily fatigue, combined, perhaps, with an insufficient diet — as bakers' or butchers' boys. In these cases, then, it would appear to occur, first, from over exertion; 2dly, from general debility occasioned by that circumstance, and by bad or insufficient diet; in this way the passive agents or attachments of the joints have more to do, and a greater force is exercised constantly upon them, than natural, from the muscles becoming fatigued and unable to continue that uninterrupted action which at all times takes place in perfect health, with an amount of power constantly equal to their labour; but the moment the muscles become over fatigued, the ligaments are then called upon to assist the muscles in supporting the body in the erect position, and from their inability to do this constantly, without yielding and becoming elongated, the knee-joint yields inwardly in proportion to the unusual stretching the ligaments are subjected to, and when once the force is directed obliquely, instead of directly on the articulating

surface, the yielding proceeds more or less rapidly with the deformity. When the deformity is considerable (as in this cast,) and has been so for some years, does the articulating surface itself, alter in position, or does the internal articular surface of the tibia diminish in size, and allow the internal condyle of the femur to sink? Or does the internal condyle itself alter and increase in size, and project more than it does in its natural size? I do not believe that either of these changes takes place, although in the case mentioned, a separation might be felt between the tibia and femur internally, after the legs were brought into a straight line. My opinion is, the articulating extremities are not in fault, certainly not primarily, and the only doubt that exists in my mind is the possibility of the articular surfaces growing in this position, supposing the deformity to have arisen during the earlier period of childhood. We have had patients at this Charity, the most severe cases met with in whom, after many months' treatment, when the legs have been straightened, and where there was no curvature of the bones, the joints have maintained their position, without support of any kind, and without the joint yielding in the slightest degree — even the case of which this is the cast; the patient being eighteen years of age, within twelve months he could stand and walk without any artificial support, and without the joint maintaining this position. I have a patient, aged seventeen, at this moment, who was operated upon eighteen months since, and whose joints now are perfectly recovered, and he can maintain their proper position unassisted. In children I have not seen an exception to this. But the case mentioned to you before, certainly is an exception to this, as at present it is three years since the operation, and he cannot walk without his supports, so that although I believe no alteration takes place, certainly none by attrition — for I cannot conceive the possibility of the cartilage being reproduced after it has been rubbed down — yet it is a question on which, from our present experience, I am unable to speak positively. I can understand the articular surfaces of the tibia and femur being altered in position from curvature and in the shafts of those bones, but this is not a change in the articular surfaces themselves, but in the support or pillars on which they rest. Look, for example, at the bones of a congenital talipes varus, a skeleton of which I have seen; we do not find the bones suffer by friction, or the articular surfaces altered, except in the slightest degree, although the malposition is extreme, and in a joint upon which the whole

weight of the body is supported ; so that this idea does not appear to me to be founded on fact. But if the bones are curved, and thus alter the position of their extremities, then I can understand how the articular surfaces become perfectly adapted, and in fact produce this deformity. You will always find contraction or rigidity of the biceps tendon in these cases, and very frequently of the fascia lata and vastus externus, which will be more or less contracted, according to the severity of the deformity, and the length of time it has existed. These patients suffer severely from weakness of the joint, and if the deformity is allowed to proceed, are rendered at last totally unable to follow their occupations if laborious. When it is confined to one leg, with outward curvature of the other knee, they are very liable to fall from any irregularity in the surface, and when they do, the sensation conveyed is that of dislocation of the joint, causing the most acute pain, which will occasionally last twenty-four hours, and confine them to their bed or couch. The cast before you is an instance of this kind, and the patient was 27 years of age : his leg has perfectly recovered itself, and he is enabled to walk without any support. It has a perfectly natural appearance, which, on his return home, immediately after the operation and treatment, which occupied less than a month, was so conspicuous, that inquiry was made “if he had had his leg removed and set straight.” He was a reporter, and originally a weaver, to which occupation he attributed his deformity, together with a spare diet. You will find in some of these cases, as I mentioned to you in younger subjects as incipient, actual lateral curvature ; which appears to come on simultaneously with the deformity in the knees, and to progress in the same ratio. We had a case some time since in the Institution of this kind ; very severe inward inclination of the knee, combined with lateral curvature, and from the patient’s account they appeared to rise simultaneously ; too much attention cannot, therefore, be paid to it in its early stage.

TREATMENT OF GENU VALGUM OR KNOCK-KNEE BY GENERAL MEANS — AND MECHANICAL — GENU EXTRORSUM OR OUTWARD INCLINATION OF THE KNEES — TREATMENT OF DITTO.

We will now consider the treatment, which consists of general, mechanical, and surgical and mechanical means combined. In children, when the deformity is slight, or where there is great mobility of the joint, so that the legs can with slight force be brought into the straight position,

and when the general health is, and has been disturbed, from whatever cause, your attention must be directed to the improvement of the general health in the first instance, and to the removal of the causes of such disturbance, if they still exist. You will, as I mentioned to you, find the secretions unhealthy, the appetite bad, the surface soft and flabby, and a generally diminished tone of all the tissues, occasionally — I may say frequently; the abdomen large and tumid, either with or without mesenteric disease. You will then have recourse to those measures of relief which may appear best adapted to each individual. I have found alterative doses of the Hydrargyri c. Creta, every other night, continued for some time (say two or three grains), according to the age of the child, of great use, with Tincture of the Sesquichloride of Iron, in small doses, administered three times a day, either in water or Infusion of Calumba. I say small doses, for I have frequently seen irritation set up in the mucous membrane of the alimentary canal, from what is generally considered as an ordinary dose. Children in this state do not bear medicine except in the mildest forms, nor is it necessary, for we are not called upon to treat an active disease, nor do we expect any sudden or immediate change; but rather to assist than supersede nature in her efforts. The form I have ordered is ʒss. of the Tincture to ʒvj. of fluid, of which they take, at twelve months of age, one tea-spoonful, two or three times daily; if two years of age, two tea-spoonfuls at a dose, and so on in proportion; and in this way all the good effects expected are derived without the risk of gastric irritation. You will find it necessary to pay attention to the diet also, which should consist of milk, eggs, meat, and plain food. These unfortunate children are dosed with, what is called “tea,” which means warm water, night and morning, with bread and butter, which is far from sufficient nourishment. Occasionally I recommend small quantities of beer: by these means the improvement is generally rapid, if properly followed up by the parents or attendants of the child. If, then, the deformity is to any extent beyond what we shall call incipient, you will derive much benefit from the use of the straight wooden splint, either applied by strapping it to the limb through its entire length, or with straps and bandages, as we use at this Charity. If, however, the deformity is to any extent, you will find the splint I have adopted and used with great comfort to the patient and satisfaction to myself, the best mechanical means, either with or without an operation (Fig. 27). In the most severe deformity in a child

under five years of age, you may cure it in this way, provided you proceed cautiously, and keep the limb in its proper position, well adapted to the splint, which admits of being applied in any position in which the limb may be, from the most simple to the most severe case.

I have used with advantage a splint made of two zinc

Fig. 27.

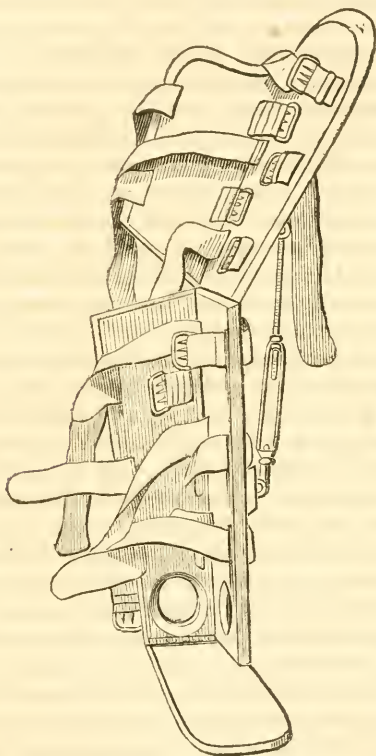


Diagram of the splint, which consists, as may be observed, of two portions, the one for the thigh, the other for the leg, and united by means of a hinge, fixed on the outside of the splints. Straps are alternately placed throughout the entire length, so that the leg is retained in position both on the posterior and lateral surfaces. By means of the male and female screw at the outer side, it can be applied at any angle, and extension can gradually be kept up.

plates, the one portion to correspond with the thigh, the other with the leg, as in the splint represented, but instead of a screw, a straight piece of iron or wood attached by a

hinge to the centre of each of the portions of the splint on the outside. The zinc, from being soft, admits of being applied close to the limb, and can be fixed by means of strapping in the position in which the joint is ; a webbing strap passed round the knee and over the connecting piece of iron will, by gradually tightening it, effectually straighten the limb. In some I have also added a joint in the centre of the iron to correspond with the knee-joint, so as to allow of flexion and extension, but I prefer the knees being kept extended.

Of course the division of the tendon will expedite the treatment, but not, I think, sufficiently to warrant its being done at this early period. At a later period, however, when the tendon is very tense, I would advise its section, which you will do in the following manner. Let the patient lie on his side, and let the assistant place one hand under the lower portion of the inner side of the thigh, so that the leg rests as it were on his hand, and with the other hand grasping the leg, let him endeavour to straighten it. In this way the tendon will be rendered more tense, and may be readily felt as it passes on the outside of the joint. You then introduce a small sharp-pointed knife under it, turn the sharp edgetowards the tendon, and divide it; or you may adopt this plan, which is sometimes preferable: direct the patient to flex the leg, and direct the assistant to offer some resistance ; in this way the tendon is raised, as it were, from the joint, when, by passing the knife under it, the assistant at the same time forcibly straightening the leg ; then on turning the sharp edge towards the tendon you will find it is divided most easily ; but you must be careful the knife does not pass through the skin, as by the suddenness with which it is done there is some risk of this occurring.

You may occasionally divide the peroneal nerve. I have done so in two instances. Paralysis of the flexors of the foot was the result in both cases, which continued from four to eight, or ten weeks, but the power gradually returned, and no evil result followed. If you pass your knife carefully under and close to the tendon, not beyond it, you will not divide the nerve, except it is lying upon the tendon : it is as well to use every precaution to avoid this, as the paralysis occasions a good deal of doubt and uneasiness to the patient, or friends, which you will find the greatest difficulty in allaying, as they will tell you they fear the loss of the use of the foot, which in fact is for a time actually the case. You then place a piece of lint and strapping over the point of puncture, and support the limb with a

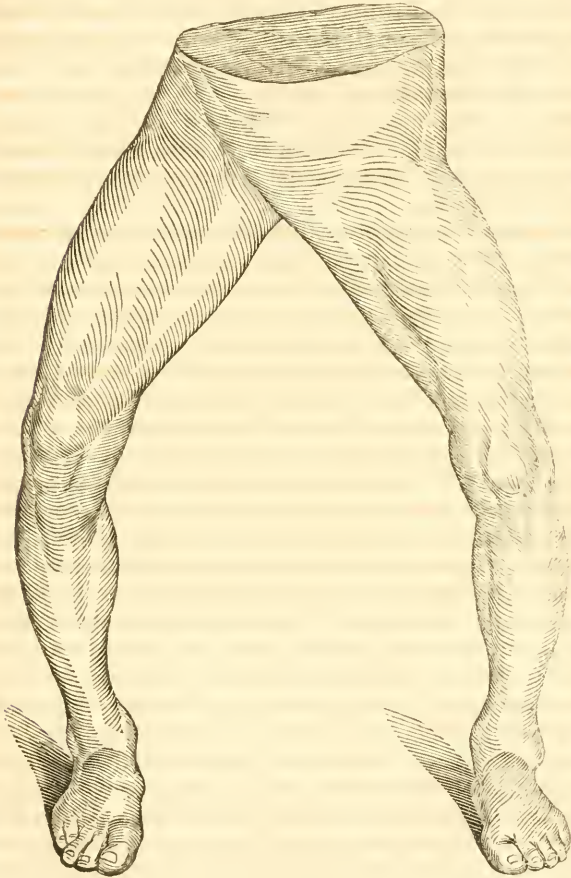
bandage, either with or without a splint : I prefer in all cases the use of the splint, as it serves to keep the joint motionless, and adds much to the comfort of the patient. In the course of three or four days you will generally find the puncture healed ; you then apply the splint, and proceed with the extension, more or less rapidly, according to the severity of the case, the rigidity met with, and the pain experienced by the patient ; for I need not tell you, that the restoration of the limb to its natural position, after years of its being kept in the malposition, is always attended with pain ; the pain, however, should never be allowed to interfere with the appetite, or rest of the patient : this you may regard as a guide in the treatment. I am now speaking, recollect, of the pain in the joint itself, not that which may be occasioned by undue pressure, which last ought to be immediately relieved ; you must at all times be careful that the pressure is uniform throughout the entire extremity, as you may be inconvenienced, and have the treatment retarded, by a slow and open wound. After the limb is restored to its perfectly straight or natural position, you will order upright supports from the hips downwards, and keep the knee-joint in the straight position during the time exercise is taken : the leg may be flexed and extended at other times. These supports must be continued night and day, until the patient is enabled to stand and walk without the joints yielding: and must not be omitted before, as a relapse will certainly be the consequence, independently of prolonging the treatment. In slight cases, in the adult or youth, irons alone, the knees being kept straight, perfect the cure of this deformity, and in a short time, compared with the more severe. In children, when merely incipient, the use of the rocking-horse, with attention to the general health, will supersede the necessity of mechanical treatment, as there is a constant effort made in riding to cling to the horse, and adduct the legs ; hence the bowed condition of the legs of those accustomed from early life to horse exercise. It is of no use to attempt to straighten the legs solely with irons, if the deformity exists to any extent, as the legs will rotate in them, and the thigh and leg become everted, which disguises, but does not relieve, the deformity. Numerous cases of the kind have presented themselves at this Institution. Irons are only of use in severe cases, after the legs are straightened, in maintaining the position, by assisting the joints to bear the superincumbent weight of the body during the time they are incapable of doing so unaided, and allowing exercise to be taken whilst the ligaments are

gaining strength, which exercise improves the general health and strength of the patients, and enables them to follow their usual occupations without risk of relapse. It is a common thing to find females with a slight deformity of this kind, or a tendency to it, which I attribute to the great width of the pelvis, compared to that of the male, and which causes the thighs to be separated from each other to such an extent at the upper part, that the articular extremities of the lower ends or condyles are necessarily placed in an increased oblique position, the internal condyle projecting. This alteration in the pelvic extremities is, as you are aware, the only change that takes place (in my opinion) when the deformity arises without debility, or when the articular surfaces of the femur are in their actual proper contact in every direction with the articular surface of the head of the tibia.

I must now draw your attention to another deformity of the knee, namely, outward inclination, of genu extrorsum (see Fig. 28); this is also a very common affection in children whose constitution is naturally unhealthy, and who are rachitic, and is invariably combined with curvature of the tibia and fibula, which I regard as the immediate cause; the patient appears to be bow-legged when it affects both legs. You will occasionally, but rarely, find it in one extremity, and combined, as you are aware, with knock-knee in the fellow limb. It does not appear to arise from any alteration in the relative position of the articular surfaces of the tibia or femur, or from any change in the healthy condition of the ligaments attached, at least not permanently, but occurs in this way. If the tibia is curved outwardly in one sweep, commencing just above the internal malleolus, the head of the bone is of course thrown more outwardly than is natural; the femur being held firmly by the connecting ligaments, and being freely moveable in the hip-joint, as a matter of course follows the direction of the tibia; then the legs diverge from each other in one uninterrupted curved line from the hips to the ankles, and if you grasp the thigh firmly, and then attempt to straighten the limb, you will find by doing so, which you generally can to a greater or less extent, that an interspace can be felt between the internal condyle of the femur, and the internal articular surface of the head of the tibia, showing that in their curved position the articular surfaces still remain in actual contact, and that the deformity does not consist in a relaxed condition of the ligaments, but in the articular surface being thrown out of its natural horizontal position. Outward inclination will

occasionally be met with to a great extent, the knees being several inches apart, whilst the internal malleoli are in actual contact; it is combined in these severe cases with talipes valgus, as in knock-knee, only with this difference, that in knock-knee the articular cavity of the ankle-joint is in an oblique lateral direction, the outer side being raised

Fig. 28.



Cast of a patient 26 years of age, in which may be observed the general curve of the tibia, commencing immediately above the internal malleolus, and the raised condition of the internal malleolus, as described.

and higher than the inner, while in outward inclination of the knee you have just the reverse, namely, the inner side is raised, the outer depressed; in the one case, the

stretching and elongation of the internal lateral ligaments arises principally from the pressure occasioned from the weight of the body; in the other, it occurs from the raised portion of the malleolus, combined with the weight of the body: or if the astragula keeps its relative position in the articular cavity, the patient will be thrown on the outer edge of the foot; but as the outer edge is the first portion which touches the ground in these cases, when the weight of the body is thrown upon it, it is forced upwards until the whole of the sole of the foot touches the ground, and this can only take place by the elongation of the internal lateral ligament. You will perceive what I mean by referring to the cast before you. This deformity arises during the early period of childhood; I have never seen it occur at a later period, nor can it, if my opinion be true that the curvature in the bone is the primary cause, as this softened condition of the osseous system is as a rule confined to childhood; the bones become hardened as the child increases in age, and the general health improves, after the irritation of teething, and the eruptive diseases, have ceased to exist, provided the osseous disease is not constitutional. Of course you have the rachitic condition in patients who have arrived, or nearly so, at adult age, but these affections differ from those in which the bones merely yield, for, in these latter, not only a yielding, but a brittleness of the bones generally exists, which admits of fracture from slight causes; as in the *fragilitas osseum* met with in old people: patients thus affected walk in a very unsteady manner, with what is called "a whaddle," rolling from one side to the other, and do not possess that free motion which is natural in the normal position of the knee-joint. It is true the knee is flexed and extended, but not to its full extent; the patient losing power in proportion to the deviation from the straight line: it is a hideous deformity, giving the patient an appearance of diminished size and stature, and it is instantly recognised by every individual. The treatment is general and mechanical: in children affected with this deformity, you will find very generally that unhealthy state of constitution I have already described, existing with those affected with the last mentioned deformity; this must, of course, be attended to by administering alteratives and tonics, with attention to the diet. The mechanical means we adopt consist of straight splints on the inner side of the leg, extending high up above the knee, and below the internal malleolus, well padded at the points of pressure, and webbing straps applied round the leg and splint, so that a constant steady pressure may

be kept up : it is only by the most gradual and uninterrupted treatment that good can be obtained, for you must recollect that not only the knees, but the bones also, are affected, and a child cannot bear any amount of continued pressure ; it must be so applied that the child is subjected to no pain. This rule must invariably be your guide ; you can in this way in young subjects overcome the deformity, and if the splints are carefully applied, the little patient can walk with greater comfort and firmness with them than without them. Irons have been and are daily used ; I object to them, because you cannot keep up such uninterrupted support as you can with a webbing strap and splint, and without this, of course, all treatment is useless. It will occupy many months, which it is as well to inform the patients or friends, as they will become impatient and dissatisfied. With regard to those who have been thus afflicted for years, when the bones are consolidated, it a question if you should try or advise any treatment : you must recollect the articular surfaces are not in fault ; therefore, if you straighten the leg at the expense of the articular surfaces, you cannot expect the patient to be enabled to manage without a support. We have had one patient in the Charity, about twenty-six years of age, who was determined to have something done, and who submitted with the prospect of wearing irons for life ; in this case I divided the semi-membranous and tendinous tendons, straightened the legs about half, by means of the splint which I adopt in knock-knee ; the splint being applied on the inner side of the leg. A great improvement in his appearance is the result, but not such as would have induced me to have submitted to the treatment, or advise its being done in similar cases.

LECTURE VII.

DIVISION OF THE VASTUS EXTERNUS AND FASCIA LATA FOR KNOCK-KNEE, RELAXED CONDITION OF THE LIGAMENTS OF THE KNEE-JOINT, ADMITTING OF UNDUE MOTION ANTERO-POSTERIORLY: TREATMENT. CONTRACTION OF THE KNEE COMMONLY CALLED ANKYLOSIS — CONGENITAL, NON-CONGENITAL. CAUSES OF NON-CONGENITAL ACTING DIRECTLY: INJURIES OF VARIOUS KINDS; INFLAMMATION SIMPLY; RHEUMATISM; SCROFULOUS DISEASE, OR "WHITE SWELLING," WITH ABSCESSSES ABOUT THE JOINT: TREATMENT. INDIRECT CAUSES: INJURIES TO THE SPINE — CEREBRAL OR SPINAL IRRITATION.

IN my last lecture I omitted to mention to you the mode of dividing the vastus externus and fascia lata, which is frequently necessary in the severe forms of knock-knee. After having divided the tendon of the biceps flexor femoris, let the assistant continue the forcible extension: you then examine the fascia lata just above the external condyle of the femur; if it is tense, pass a sharp-pointed knife beneath it and the vastus externus, from behind forwards, and divide it from within outward. It is a simple operation, and one free from any casualty, as you have nothing but the bone on the inside. After the division, proceed as I described to you with the after-treatment.

To-day we shall consider, first, a condition of the knee-joint occasionally met with, which consists in a general elongation of the ligaments connecting the joint, and admitting of an undue amount of motion antero-posteriorly, which allows of a greater amount of extension, without any permanent deformity or malposition, the malposition taking place only during the time the patient is taking exercise. It consists, then, in relaxation of the crucial ligaments, combined with a generally diminished tone of the muscles, as well as of the body generally, allowing the head of the tibia on its anterior surface to approximate to the anterior surface of the condyles of the femur, the posterior surface being separated to a greater extent than is natural, whereby the thigh and leg appear curved posteriorly, and the popliteal space lost, and appearing convex instead of concave. This affection is generally met with in children of delicate constitution, oftentimes combined with paralysis and antero-posterior curvature of the spine, which has been occasioned

by ulceration of the bodies of the vertebræ; and patients affected in this way possess no steady method of walking, for as soon as the body is carried beyond its perpendicular position with the leg which is supporting the body, whilst its fellow is carried forwards, a sudden yielding and jerk take place, owing to the relaxed condition of the ligaments, as far as the ligaments admit of, and the muscles for the moment have no firm attachment, so that the patient appears to sink in a measure on each step taken. This produces a great sense of weakness and difficulty in walking, with inability to take much exercise without suffering from fatigue; and the very circumstance of walking occasions an increase of the deformity, in consequence of the continued stretching kept up in the ligaments. Of course your treatment will be directed to such means as will improve the general health of the patient, together with the best and most uniform support to the knee-joints; as it is only by keeping the knee-joints fixed, or, at all events, so confined that any undue motion is effectually prevented, that you can by possibility effect a cure, as, if this play in the ligaments is allowed, they cannot be expected to contract upon themselves, and to limit the motions of the joint to its natural standard, no matter how much the health of the patient may be improved.

The means I have adopted with those unable to go to the expense of irons, is a straight splint, well padded, behind the leg, either retained in its position with strapping or bandage. This compels the patient to walk with a stiff knee for a time, but will nevertheless effectually overcome the deformity, if persevered in. In others more fortunately circumstanced, I have ordered irons having a stop-joint at the knee, which enables them either to use the joint or not as they may feel inclined, with a screw pad pressing on the anterior surface of the femur, just above the knee; with a similar one behind the calf, just below the knee. These pads you will be enabled so to adopt that no motion can take place beyond the extent wished for; the knee itself being firmly held by a double knee-cap. I certainly prefer that the knee should be kept stiff whilst the patients are taking exercise, as the less amount of continued motion the better, in my opinion, although that motion may not be in itself excessive. The patients can then, if they wish it, press the bolt backward which retains the iron in the straight line, and flex the joint whilst in a sitting posture.

The time occupied in treating a case of this kind will vary according to the general health of the patient, and the

success attending your efforts made to prevent any undue motion of the joint, which must be most unremittingly persevered in until the patient is enabled to walk, unassisted by support, without the yielding taking place; and even then I would not advise the entire absence of the support. It is much better to commence in this way, say half an hour daily for the first few days; and if no return of the deformity occurs, or increased motion takes place, extend it to an hour, and so on, that the patient may be accustomed to forego by degrees the support; and should any relapse take place, let any increase of it be at once prevented.

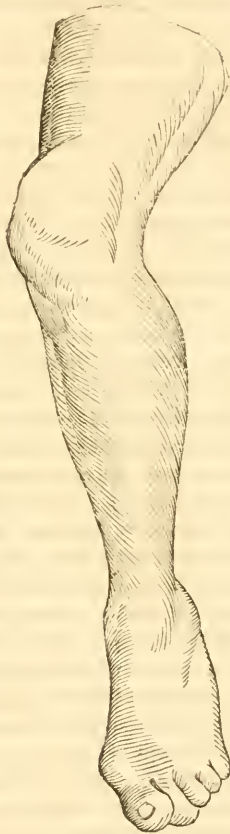
We now come to one of the most important of all deformities, the most important also of the knee-joint, involving almost invariably the necessity for a patient afflicted with it walking with crutches, or a wooden leg, which is of course a severe inconvenience, independently of the deformity itself preventing those suffering from it taking any active exercise; I allude to —

CONTRACTION OF THE KNEE-JOINT IN THE FLEXED POSITION.

I say in the flexed position, because, in knock-knee, you have muscular contraction, as well as in the straight or extended position of the joint, as I shall hereafter mention to you: this is commonly called ankylosis of the knee. This deformity, or *malposition* (for that is its real character), consists either of a permanently flexed position solely, or flexed and everted combined, a semi-rotated condition of the tibia on the femur — that is, if the legs were brought into the extended position, the knees would be found to incline inwardly to a greater or less extent, and the foot and leg everted. There is also another change of the relative position of the bones frequently met with in combination, namely, a receding of the tibia upon the posterior surface of the condyles of femur, involving the necessity of an alteration of structure, or of the natural relative length of the ligaments being lost, as will be hereafter seen. It is a congenital and non-congenital deformity; but so rarely is it met with congenital, as to form the exception. In the congenital deformity you have simply a contraction of the flexor of the knee, unaccompanied with any alteration in the healthy condition of the joint itself, but combined occasionally with one or other of the deformities of the feet mentioned. (Fig. 30 and 32). I have once met with it without any deformity of the feet; once with talipes calcaneus of both feet, both knees being contracted; twice with talipes varus of both feet, in one of which a relaxed condition

of the whole of the ligaments of the tarsus existed in one foot, allowing of free motion between all the bones, and in the same case congenital luxation of the right hip. I say

Fig. 29.



An example of congenital contraction of the knee, taken from a patient aged 19, in whom both knees were similarly contracted. The joint, as it may be observed, retains its normal position.

luxation, because the word conveys what I wish you to understand, although, upon examination, so far as the muscles and integuments admitted of, no trace of an acetabulum could be discovered. The head of the bone could be distinctly felt on the dorsum of the ilium, and was freely moveable in every direction; it evidently was perfectly exposed and free. The leg could be drawn down without

any impediment being felt beyond the resistance of the muscles, which leads me to suppose there is at all events no brim of the acetabulum or cotyloid ligament. That patient suffered also from severe lateral curvature, whether congenital or not I am unprepared to say, combined with a semi-rotated or twisted position of the vertebræ, and flattening of the ribs, which presented posteriorly an acute angle; in fact, a more generally deformed condition, or more miserable object, can scarcely be imagined. In all my experience I have never met with a more distressing case. In the case in which double varus coexisted, the skin was adherent to the patella, and was indented, presenting the appearance of an old cicatrix. In the first case mentioned there was no additional deformity or malposition, simply contraction of the flexors, and perfect voluntary power of all the muscles, so far as the contraction admitted of, (*vide* fig. 29), the joints themselves being perfectly healthy, and the articulating surfaces in their proper relative position, that position being the flexed, but not quite to a right angle. The patient was also enabled to flex the joints to their full extent, and to extend them, as I have said, as far as the contraction admitted of, at will; there being, in these cases, no evidence of any diseased condition existing, or having existed, in the nerves or muscles. I regard this deformity also as the result of position in utero, when unattended with malformation or deficiency of formation in any of the natural structures; for I imagine it is not more difficult to conceive that the extremities of a child may be so placed, during uterine existence, that they will admit of very little motion in the extended position of the knees, than to imagine the feet being placed and kept in those positions in which we find congenital deformities of the feet.

With regard to the non-congenital, which you will have the more generally to treat, and which are by far the most serious and difficult, the causes are numerous; and I would divide them into those which act directly, and those which act remotely, on the articulation. Of those acting directly, may be mentioned, injuries of various kinds; inflammation of the synovial membranes, whether it be confined simply to the joint, or whether it be the result of rheumatic condition generally, affecting one or both of the knee-joints particularly, and resulting in contraction of the flexors; inflammation of a chronic character of the synovial membrane, arising from scrofulous disease of the joint itself, or, as is most frequently met with, in the neighbourhood

of the joint, and producing chronic inflammation of the synovial membrane, from the irritation occasioned by its close proximity to the joint, oftentimes surrounding it in almost every direction, but without causing any change of structure in the joint itself, beyond the synovial membrane. Among the remote causes may be mentioned, injuries to the spine, producing pressure on the chord, and paralysis, in the first instance, of the entire lower extremities; cerebral or spinal irritation, or disease producing partial loss of power in the extremity or extremities, sometimes complete loss of power, in which case, upon recovery from it, as in the last mentioned, contraction of the flexors is a consequence. The first mentioned, namely, injuries to the joint, consist of the various mechanical accidents to which every one is exposed, such as the joint being jammed, or those caused by any sharp or blunt instrument, the joint itself being exposed or punctured. In either case inflammation more or less severe is the consequence, during the existence of which the joint is kept in the flexed position, and upon recovery from which a permanent contraction is found to exist, with or without alteration to a greater or less extent in the synovial membrane: as I mentioned to you, when speaking of the deformities of the feet, there is a constant effort instinctively exercised to keep the joint at rest, the slightest motion occasioning the most severe pain; and the position in which there is the least amount of pressure on the articular surfaces, and therefore on the synovial membrane, is undoubtedly the flexed position, as in the straight position, even without the additional pressure occasioned by the weight of the body, there must be a small amount of pressure between the articular surfaces; and, be this ever so slight, if the synovial membrane is inflamed, it must of necessity increase the inflammation, and consequently the pain, which is, as you are aware, at all times most acute, and requires in its active stage the most prompt and vigorous measures for its relief. The flexors, therefore, are constantly acting, and become eventually contracted, from the flexed position being maintained during the inflammatory attack; and should there be any disorganisation of the joint itself, or parts composing it, you will have also more or less lateral or posterior displacement, combined with the flexed position. In those cases, of which we have had several, I have been of opinion that the synovial membrane has become altered in structure, thickened, and inelastic; and there has appeared also adhesions of some kind, as in all

these cases I have found the joint to possess scarcely any perceptible motion ; and if any the smallest in amount, and that motion being independent of the muscles themselves, as you will generally be enabled to discover, provided you continue your extension for some minutes, by which method the muscles will relax, and you will be enabled to form a correct opinion of the resistance existing in the joint itself ; besides, in these cases, you will generally find the joint not only flexed, but immoveable in the flexed position ; that is, you will be unable to flex it beyond the position you find it in, which can be invariably accomplished in cases where the joint itself retains its integrity, and as may also be seen in cases arising from paralysis, when free motion exists so far as the contraction admits of. These cases, then, arising from wounds inflicted on the joint itself, will appear, upon a superficial view, to be perfectly ankylosed, and will require the most scrupulous care in examination before you decide on their real condition.

In one case admitted into this Institution, which arose from a cart-wheel passing over the thigh, just above the knee, there was motion, but of an elastic kind ; and after the leg had been forcibly extended, it returned with an impulse to its contracted position, without the flexors acting in the least ; so that it was evident there was some adhesion or adhesions in the joint itself. The flexors I divided however, and the extension was kept up for some weeks with very little benefit ; and from the severity of the increasing forcible extension necessary, the patient suffered so much that he left the Institution, determined to submit to no more treatment. But after a few more weeks he returned penitent, and engaged a lodging close to the Charity, when I re-operated, and again commenced extension. We progressed, as heretofore, but very slowly, and, from his good conduct, the committee re-admitted him. From the constant pressure again kept up on the anterior surface of the thigh, a slough made its appearance, upon the healing of which I resolved to make no farther attempts, and informed the patient that I feared nothing more could be done for him, and advised his procuring an instrument to hold and fix the joint in the position in which it then was. This frightened him, and he set to work to screw his leg straight at all hazards, upon doing which a sudden and loud snap was heard, compared to the report of a pistol by the other patients, and immediately his leg could be placed in the straight position, or nearly so ; since which occurrence the leg has been kept without difficulty, very nearly straight,

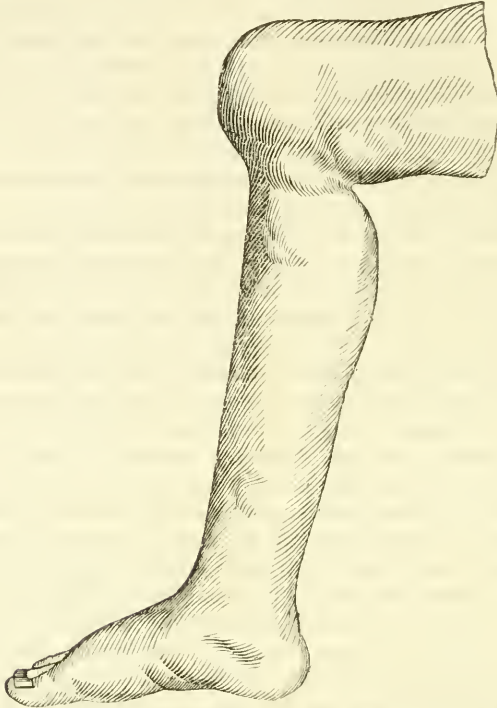
and he has left the Charity with a comparatively useful limb. This, therefore, is a valuable and instructive case, as it justifies an amount of force being used in similar cases, after other means have failed. He suffered pain only from motion, and has not been in any way inconvenienced beyond the temporary pain mentioned.

I also stated inflammation of the synovial membrane as a cause; I mean idiopathic inflammation of the joint, which arises without any apparent cause, and without the general health having previously suffered: in this case, if the disease is not stopped at its onset, effusion into the synovial cavity is the result, and, of course, a change whether permanent or not, in the synovial membrane, is a consequence (Figs. 30 and 31). In simple inflammation, however, the results are not so severe, if properly attended to, as in inflammation arising from injuries, or from a rheumatic state of the constitution, when it assumes more of a specific character, and is oftentimes more obstinate, yielding but slowly to treatment. But, whether simple or not, the effects are the same, if the position of the limb is unattended to, namely, contraction of the flexors of the joint, which contraction becomes permanent, whether there is or is not any evident change in the secretory surface of the synovial membrane. In rheumatic inflammation, as I mentioned, a change of a serious character frequently results, producing adhesions, which, if allowed to remain passive, terminate in complete ankylosis. Several cases have presented themselves in whom not the slightest motion could be detected by the exercise of great force, and that after a few years' duration. In fact, cases have occurred where three years only had elapsed, and this condition of the joint existed, rendering any attempt at cure futile. Of course there are exceptions to this; and if motion is found to exist, and all evidence of diseased action gone, you will at all events use every effort to restore the position of the limb and the functions of the joint. This cause is therefore as serious, if not more so, than we have considered or shall have to mention, and will require the greatest attention and perseverance in the treatment.

We come now to another cause mentioned, namely, scrofulous disease of the joint, or in the neighbourhood of the joint. This is, as you are all aware, a very common cause, and one which frequently results in the limb by amputation; and I would beg to draw your attention to what I consider to be the actual condition of the joint and the character of this disease. My remarks must apply to

children and young subjects, as of course, in the adult this disease does not present the same uniform character, nor have adult patients that innate restorative power which is so active during early life. Now I regard this affection

Fig. 30.



An example of contraction of the knee from inflammation, in which the displacement, viz. partial dislocation of the tibia backwards, is most apparent. Taken from a female aged 19 years (vide also fig. 32).

as one of the ordinary processes attending a departure from the healthy state, whether it attacks the bones surrounding the joint, the synovial membrane, or the cartilages and ligaments themselves, and not as a disease of a malignant character, admitting of no known remedy, and which terminates ultimately in the loss of the part affected, and oftentimes in the loss of life. Now, what are the physiological conditions of the parts entering into the composition of a joint? It is composed of bones, ligaments, and a delicate semi-transparent membrane, called the synovial membrane. The bone is the foundation, if I may so speak; the cartilage

is so arranged that it gives an elasticity and smoothness, and in this way facilitates motion, whilst the synovia secreted by its membrane lubricates the surfaces; and by these means the motions of the joints are rendered perfectly

Fig. 31

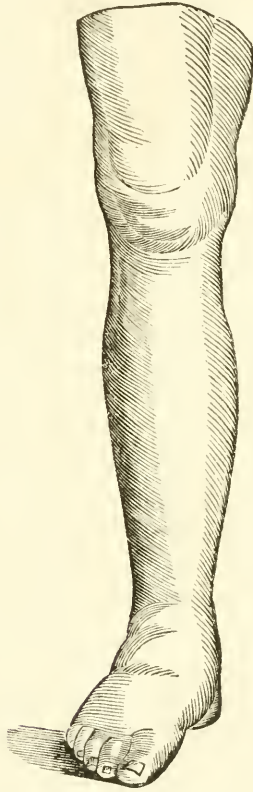


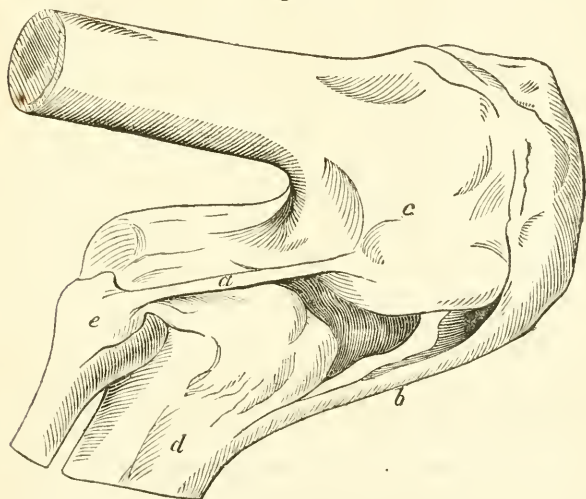
Fig. 30, after treatment. The position of the bones was perfectly restored by means hereafter to be mentioned.

free and uninterrupted, the articulating surfaces gliding insensibly over each other. The bone and cartilage exist in a comparatively low state of vitality, and do not possess the power of resisting the effects of disease, at least only in a comparatively diminished degree; whilst the synovial membrane readily becomes the subject of disease, and, when it does so, the disease is generally of an acute character, which in a short space of time, alters its secre-

tion, and, if the inflammation proceeds, the membrane itself becomes altered in character, and, instead of facilitating the movements of a joint, becomes in fact a direct obstacle, and, according to the amount of change in structure, limits or entirely prevents the natural motion taking place. From the fact of bone and cartilage possessing a low state of vitality, and being incapable of resisting to any extent the effects of diseased action, after positive disease has existed and subsided, the restorative process is, as might be easily anticipated, exceedingly slow, under the most favourable circumstances, and if the cartilage has been destroyed, it does not effect a reproduction, but is supplied by a sort of ivory substance, polished and hardened, supposing the diseased action stops at the cartilage. The synovial membrane also, if a great change has taken place, does not reassume its thin, elastic, semi-transparent character, but remains more or less thickened, and its secretion is either altogether lost or altered in quantity and character, and although motion is admitted of, yet it is not that free unlimited motion which the joint possesses in its healthy condition. In the knee-joint you have also the crucial ligaments surrounded by the synovial membrane, and forming the most important connexion of this articulation. If, then, inflammation takes place in the joint to any extent, of course the ligaments must suffer more or less, becoming softened, and unable to fulfil the office for which they exist, namely, retaining in position the articulating surfaces of the condyles of the femur, and head of the tibia. Now, by becoming softened or weakened, of course the muscles would tend to occasion a displacement of these bones to a greater or less extent, independently of the contracted or flexed position, as if the bones were not firmly held in apposition; the head of the tibia will be drawn out of its natural position by the constant action of the muscles, in the direction in which there is a preponderance of power, and this direction is both backwards (vide fig. 30), and lateral, or both combined (fig. 32), occasionally also with more or less rotation of the tibia (fig. 33), the lateral deviation being to the outside, from the great power exercised by the biceps, flexor femoris, as this muscle is not only very powerful, but passes more on the outside than the semi-membranous and semi-tendinous do in the inside in their course to their insertion; these two last mentioned lying more behind the joint until they wind round the head of the tibia. It is in this way only that I can explain the abduction of the leg, of which we shall presently speak. The restorative pro-

cess is, as I have just stated, of necessity an exceedingly slow and tedious one, under the most favourable circumstances; whether the disease attacks the joint itself, or the extremities of the bones surrounding it, primarily, the joint secondarily. It requires the joint to be kept at rest, or nearly so, and a uniform support to the entire limb; the natural temperature maintained, and the general health supported, and this most uninterruptedly followed up. By these means I believe that most diseases of the joints, in young subjects, provided they are not malignant, which I do not believe they can be considered, may be cured; and

Fig. 32.

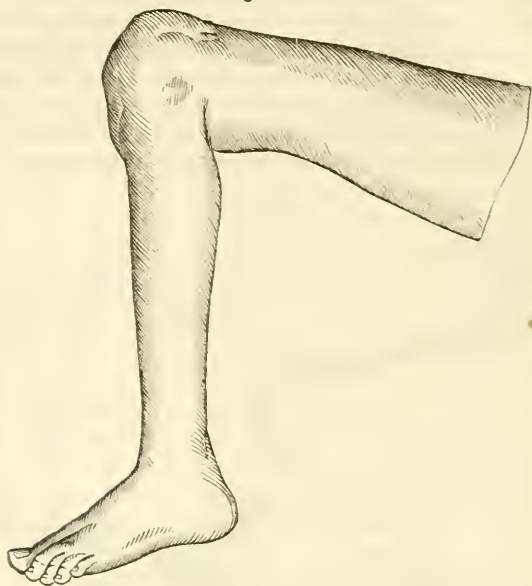


A diagram of a preparation in the museum of St. Bartholomew's Hospital, for which I am indebted to the kindness of Mr. Lawrence, illustrating the almost complete dislocation backwards of the tibia upon the femur, arising from inflammation of the joint and subsequent contraction. A, *External lateral ligament*, which may be observed to be almost horizontal; B, *Ligamentum patellæ*; D, *Tibia*; E, *Fibula*; C, *Femur*.

even if the patients have suffered from destruction of the joints and of the bones, or that portion forming the articulating surfaces, — although all motion may be out of the question, — yet I distinctly maintain that an ankylosed knee, with the use of the foot, is far preferable to a wooden leg. The most favourable position may be selected during the period the restorative process is going on. In the majority of cases of strumous disease, the joint itself is but slightly affected, although the surrounding parts are one

mass of disease. The inflammation consequent on the irritation of that disease is of a very chronic character, and does not appear in those cases to risk the integrity of the

Fig. 33.



An example of contraction of the knee, combined with abduction, and slight rotation outwards of the tibia, as may be observed arising from the scrofulous disease about the joint. Taken from a patient now in the Charity.

joint, although there may be, and generally is, an increased secretion of synovia, but beyond this the joint does not appear to suffer; at least, in an immense number of cases. I have witnessed the most frightful amount of disease, appearing in a superficial view to exist in the joint itself, and yet the joint remain perfectly sound, with the exception of the increased quantity of synovia.

I have now a case under treatment in which the joint presented the appearance of a fungous mass, with openings in every direction — enormously swollen. The anterior surface of the patella, the femur immediately above the condyles, the tibia immediately below the articular surfaces, were all diseased, and yet the joint itself was free, except, as mentioned, the quantity of synovia increased; yet this case, the most frightful that can be imagined, is yielding to treatment, and the general health of the patient is restored.

A case occurred to me three or four years since, of which the following was the condition of the patient : — The girl, about 8 years of age, was sitting on the bed in the most miserably emaciated condition, and was stated to have been suffering from disease in the knee between two and three years. There were five openings, two on the outside, just above the condyles, one on the inside, and two on the patella. The three first communicated with the femur, the two last with the patella. The parents stated that at least half a pint of matter was discharged daily. Of course, this was somewhat exaggerated, but an immense discharge was then evident, of that peculiar, thin, unhealthy secretion, common in scrofulous diseases. The knee was contracted beyond a right angle, so that you could not pass a thin piece of sponge between the leg and thigh, in the situation of the popliteal space. The knee itself was swollen, and distended with fluid. She was suffering from acute hectic fever, with profuse perspiration and severe pain on the slightest motion. The pulse was fluttering, the bowels relaxed ; in fact, the child presented the appearance of a person in the last stage of consumption. I ordered her an opiate, with the *hyd. c. creta*, every night, the *conf. aromat.* and *ext. cinch.* three or four times a day, a soft linseed-meal poultice, made by stirring the meal into boiling water, over the whole of the knee joint, covered with oiled silk. A tin splint, bent at the angle at which the knee was flexed, with pads, and retained by means of a flannel bandage, from the toes upwards above the knee, thereby keeping up the natural temperature of the entire limb, as well as a uniform gentle support ; together with a nourishing diet, consisting of eggs, milk, meat, beer, and then two glasses of port wine daily, commencing the stimulants by degrees. In a few days the general irritability subsided, and the pain in the knee was relieved, the hectic left her, and the discharge altered its character. In fourteen days she could be moved without a complaint.

This treatment was continued six months, varying the tonic, at the end of which time all the openings were closed, and the swelling of the joint almost gone. The leg was extended in the most insensible manner, by gradually straightening the splint during the period the disease was subsiding, and without pain being produced. As soon as the openings were healed, I supported the joint with *emp. cerat. saponis*, and continued the bandage and splint, and in twelve months the leg was brought into the straight position, and the girl could use it without any assistance. I

then directed the joint to be exercised daily, by forcibly flexing and extending it, as far as the feelings of the child would admit, and in this way the motion of the joint was restored, the muscles of the thigh and calf developed themselves, and a perfectly useful limb is the result. In this case amputation was advised by several surgeons as the only means of saving the child's life.

I would beg to mention another case, similar in some respects, of a boy 9 years of age, in whom what is called white-swelling had existed for eighteen months. There were no openings, but a bag of matter situated in the upper and outer side of the femur just above the condyles. The joint also distended with fluid, and contracted beyond a right angle. The same treatment was followed here: the matter gradually and entirely disappeared, the swelling of the joint reduced, and by means of the splint the leg was brought, in eight months, into the straight position, and the boy enabled to use his leg, supported with a straight splint. In this case also amputation was recommended, and would certainly have been carried into effect, had the boy assented. I have used the poultice made in the manner described, as it acts both as a fomentation, and enables you also to apply slight support to the distended and weakened capillaries, over the whole surface. The splint keeps the joint steady, and relieves the pain, at the same time that a permanent contraction is prevented by the gradual and steady extension kept up, and the flannel bandage maintains the temperature and gives a uniform support; for it is certain that no restorative process can go on if the natural temperature is reduced, which you will frequently find to be the case in these subjects. The opium greatly allays the general irritation from which they suffer so severely in consequence of continued pain, and is, according to my experience, of the greatest possible advantage.

I have ventured on this digression, because I believe that many legs are lost simply from want of attention to what are often considered trifling details, but which trifling details form, in my opinion, the most important portion of the treatment. By their use I believe that the majority of cases may be saved from the dreadful alternative of the loss of the limb, which, to the poor, whose living must depend on their daily labour, is of infinite importance, far more so than to those whose means place them beyond the necessity for exertion. It has been said that such cases are daily occurring, and occurring in every one's practice. Admitted: but does not this prove that the opinions expressed are

incorrect, and if these and others have had the use of their limbs restored, there are, in all probability, hundreds who have suffered amputation that might have possessed a useful member? It is an easy matter to take off a leg, but the consequences to the patient exist for life. How often is it said, in similar cases, "we must first get the patient into better health, and then perform amputation." Now I want to know how a patient suffering from this disease in its most severe form can, during the existence of that disease, and in spite of it, be brought into better health, into such a state of health as will admit of his bearing the operation, and yet the health should not continue to improve, and with proper attention the disease should not be cured also. It is certain, if the severe symptoms I have mentioned be allowed to continue, death must be the result; but until you can prove to me that the disease is, from its nature, incurable (I mean, of course, in young subjects), I am not prepared to admit either the necessity of amputation, nor that the disease will continue and destroy life, unless that extreme measure is resorted to. Again, supposing the bones themselves diseased, and the integrity of the joint destroyed, what is to prevent the restorative process from going on, and a comparatively useful limb being secured to the patient? We have evidence in abundance of this being effected in the instances of ankylosed joints that present themselves almost daily, of the hip, knee, and elbow. The misfortune is, and what I would particularly draw attention to, that from the comparatively low organised condition of the structure of the joint, the efforts of restoration are proportionably slow, and occupy many months of treatment, and, of course, of attention: but what is this compared with the life of the individual, and his being enabled to obtain his subsistence in any capacity he may be placed? whereas, with a wooden leg, no very active employment can be undertaken, for, independently of the appearances it presents, objections naturally arise to the employment of such individuals. My object in making these remarks is solely to direct attention to what appears to me a very much neglected disease, and I believe, in many instances, this arises from an impression that it is a disease, if not incurable, at least so far hopeless that it is useless to waste the health or time of the patients in any attempts at cure. If in these remarks I shall be the means of drawing attention to the subject, and in this way of saving the limbs of patients thus afflicted, whatever may be the opinion entertained, I shall have obtained more than I have any

reason in right to expect. The assertion of these views is a bold step, and I am well aware that my motives may and will be questioned, and my opinion disputed. I have, however, a duty to perform in common with all men, and I trust never to be deterred by fear from openly and decidedly stating my opinions, believing conscientiously that they are correct, and believing also that general good may result from them.

In reasoning upon the cases mentioned, as well as upon numerous others which have been left for amputation, but which some fortunate accident has prevented ; reasoning, I repeat, on these condemned limbs, which have ultimately been restored, I feel myself fully justified in suspecting that there are many limbs similarly affected, which might, by similar means, be restored, but which are now unhesitatingly doomed to the knife.

The next cause mentioned is one remote from the joint, namely, injuries to the spine, producing, in the first instance, paralysis, upon recovery from which, contraction of the flexors is the result, oftentimes combined with contraction of the gastrocnemius also. In these cases you have, of course, no change in the joint itself, except the change into a permanence of the flexed position, neither is there any alteration in the relative position of the bones. The patients who meet with these severe accidents are confined for a long period to their beds, and after the spinal column has been relieved from the pressure occasioned either by the bone or the effusion of blood or serum, as the muscles recover their lost power, the most powerful, which are the flexors, overcome their weaker antagonists, and a gradual contraction is the result ; so that when the patient is allowed to leave the bed, he finds himself unable to straighten his legs, and, if the gastrocnemius is contracted, of placing his feet flat on the ground, the contraction taking place previously to the patient being enabled to exercise any voluntary power. We have had two cases of this description in the Charity ; the one a man, of whom this is a cast, the other a boy. The man was a bricklayer's labourer, and fell from a scaffold, either fracturing or injuring the spinal column at the lumbar vertebræ : perfect paralysis followed, upon recovery from which contraction of both the knees was the result. The tendons were divided, and the limbs restored to their straight position, and as there was no paralysis of the extensors, free voluntary power followed, and the man left the Charity well. The boy was a sailor, and had fallen from the mast of a ship : the same result fol-

lowed, with the addition, in this case, of contraction of both the gastrocnemii. There was no remaining paralysis in this case, and the boy left the Institution walking with tolerable comfort.

In the cases that arise from cerebral disease, or irritation, you will generally find paralysis of the extensors, and contraction, in one or other of the forms mentioned, in the feet, but in these instances, as well as in those just mentioned, no disease or obstacle in the joint itself. There is, however, occasionally some displacement of the articular surface, which, I imagine, arises from the general loss of tone affecting the ligaments, and allowing of their relaxation, when, of course, the tibia becomes displaced, generally outwardly, producing, when the leg is extended, a knock-knee.

With this, gentlemen, I conclude the Causes ; in my next lecture I shall proceed to the Treatment. I must, however, apologise for having digressed on the scrofulous diseases of the joint.

LECTURE VIII.

TREATMENT OF CONTRACTION OF THE KNEE-JOINT IN THE FLEXED POSITION — MECHANICAL AND SURGICAL. MEANS OF FORMING A DIAGNOSIS. CASE OF CONTRACTION FROM INFLAMMATION SUCCESSFULLY TREATED MECHANICALLY. SIGNS WHICH MAY BE CONSIDERED FAVOURABLE ; SIGNS WHICH ARE UNFAVOURABLE. SECTION OF SEMI-MEMBRANOSUS, SEMI-TENDINOSUS, AND BICEPS ; MODE OF PERFORMING THE OPERATION. CONTRACTION OF GASTROCNEMIUS AS A CONSEQUENCE ; CONTRACTION OF THE FLEXORS AND ABDUCTORS OF THE HIP AS A CONSEQUENCE — TREATMENT OF. DISLOCATION BACKWARDS OF THE TIBIA ON THE FEMUR — TREATMENT OF.

WE now proceed to the treatment of contraction of the knee-joint ; it consists of mechanical, or mechanical and surgical combined. It is of the greatest possible importance that you should satisfy yourselves, as far as the case admits of, of the actual condition of the joint, which you will be enabled to do by a reference to the original cause, the duration of the deformity, and the amount of motion, if any, in the articulation. Now the first thing to be ascertained is, whether the disease in the joint has subsided, supposing the contrac-

tion to have arisen from that cause ; as I need not tell you, that if disease should still be present, it would be imprudent to adopt any active measures to remove the contraction. This you will easily discover by examination of the joint, and by the feelings of the patient. We have at this moment a female about 16 years of age in the Charity, who was sent up a distance of 80 miles from the country ; and, upon examination, I found an increased quantity of synovia in the joint, indicated by the prominence on each side of the ligamentum patellæ, as well as by the sense of fluctuation evident on pressure being made. Pain from motion, of a shooting character, especially when subjected to a sudden jar ; pain also at night, increased, in all probability, by the movements taking place during sleep. The knee contracted to a right angle, and rigidly so ; and any attempt to extend the leg increased the rigidity of the flexors, and also gave pain in the knee itself. This affection was occasioned by simple inflammation of the joint eighteen months previous to her admission, but which had subsided, at least the active symptoms, twelve months since. I did not think it advisable, under the circumstances, to have recourse to the operation, but recommended she should be sent to a general hospital until the disease was entirely gone. The Committee interested themselves, but without success, the girl being refused admission on the ground that rest alone was necessary. As, therefore, there was only one alternative, that of sending her back into the country, I thought it would be advisable to endeavour, by careful extension, to straighten the limb by mechanical means alone so that, in the event of a recurrence of the inflammation, she would at all events be in no worse condition than she then was, whereas, if I succeeded, it would be of immense advantage to the patient. I therefore applied the iron splint, with the male and female screw attached, and, to my surprise, the leg has been restored to its straight position ; so that here is an instance, proving to you the possibility of drawing out the contracted muscles, and thus overcoming their tendency to contract, without the operation, provided the contraction has not existed sufficiently long for it to become permanent, and before the disease has actually subsided.

After, then, you have satisfied yourselves of the cause, you will proceed to ascertain, 1st, if there is motion ; 2dly, what is the amount of motion ; 3dly, what is the nature of the motion, and the cause of resistance, — whether that resistance is owing to the muscles alone, or to the muscles and joint itself combined ; also, what voluntary power, if

any, the patient possesses at the time present. After these preliminary inquiries, let an assistant hold the thigh firmly, whilst you attempt to extend the leg forcibly. If you are able to extend it in the slightest degree, if the patient complains of pain on the anterior surface of the joint, however slight the motion obtained in this way may be, your prognosis will be favourable; and even in those cases where there is no perceptible motion, as in the cases I have described to you of injuries to the joint, in my last lecture, if the patient complains of pain in the situation mentioned, you may anticipate the possibility of removing the contraction. It is also as well to examine the patella, and to ascertain whether it admits of motion in a lateral direction, which you can do in the following manner. Place the thumb or finger of the left hand on the edge of the patella, and with the thumb of the right hand forcibly press on the other side. If there is motion, you will of course feel the edge which is pressed upon depressed, and the opposite edge raised. This is very easily accomplished in some cases, but in others the patella will appear immoveable, and require the greatest caution and care before you can be satisfied whether motion exists, as the sensation conveyed by the skin alone, in moving when pressed upon, is likely to deceive you. Here also you will be guided in these difficult cases by the circumstance of the patient complaining of pain not on the points pressed upon, but beneath the patella in the joint. Should they do so, you may rely upon it that the patella is not ankylosed either to the femur or the tibia. The patella, in severe cases of contraction, becomes lodged between the condyles, and is firmly held by the rectus above, and the ligament below, so that it is often not an easy matter to find or to satisfy yourselves of its position, much less to determine its immoveability. I have myself repeatedly been compelled to examine with the greatest care before I could discover it at all. Having satisfied yourselves there is motion, you will then look to its character. If it is a steady motion, and upon an increase of extension the flexor tendons are rendered more tense, you will regard the resistance as confined to the muscles principally; if, on the other hand, you find, upon keeping up the extension for some seconds, that the joint returns to its contracted position with an elastic impulse, you may anticipate resistance, arising from adhesions in the joint itself, and of course you will be more guarded in your prognosis. If you find free motion beyond the contracted or flexed position, that is, if you are enabled to increase the amount

of flexion without difficulty, with as much ease as can be done ordinarily, this will be a favourable circumstance. And of course you will, in forming an opinion, look at these indications collectively, having a due regard to the original cause.

If, on the contrary, the joint is immoveable, and occasions no pain upon examination; if, in continuing your extension, the muscles relax themselves, and there is no motion or pain, you will regard these as unfavourable indications, and it is hopeless to attempt restoration by the ordinary methods. If you have free motion to a certain point, and the motion becomes suddenly checked, as if by a solid substance, giving you the sensation of its being stopped by a spicula of bone, this also must be regarded as unfavourable. I have seen three cases of this kind where I believe the patella had become ankylosed to the femur, and from the tibia being drawn backwards somewhat behind the condyles of the femur, the moment the leg was extended to a certain point, it received a dead check stop, evidently caused by the patella being firmly fixed, and pressing on the anterior surface of the head of the tibia, whenever the latter was brought to the point at which the patella was immoveable; the joint being freely moveable up to that point in each case.

These are, then, the principal indications for or against the ordinary treatment being followed: I say ordinary, for you must be aware of the femur having been sawn through in cases of complete ankylosis, and immediately afterwards the leg being placed in the most favourable position, so that the bone should become united in the position adopted. This experiment is said to have been successful; but it is quite another affair, and a mode of practice I have not thought it advisable to follow.

Having, then, satisfied yourselves of the probability of being enabled to remove the deformity, you will decide as to the means to be adopted — whether mechanical alone, or surgical and mechanical combined. In all cases where the deformity has been of short duration, and where there is tolerably free motion, I would advise your selecting the mechanical alone, whether the contraction is to a greater or less extent. Bandaging the leg carefully, from the foot above the knee, and adjusting the leg in the position in which it is, in the ordinary knee-splint, with the male and female screw beneath the joint, and to which I have added a metal plate, to hold the thigh firmly in position; taking care that there is no undue pressure, by straightening the

splint more rapidly than the leg can follow, and thus inducing pressure on points, these points being generally just above the heel posteriorly, and the anterior surface of the thigh, just above the condyles, as well as at the extremity of the splint behind the thigh. If, however, the deformity has existed for any length of time, whether it is severe or not, I would advise section of the tendons of the contracted muscles, as well as any dense bands of fascia you may meet with ; for in old cases the fascia becomes contracted, and at a greater distance from the popliteal space ; and oftentimes you will find, upon examination, the region of the popliteal space filled with one dense mass of contracted fascia, and what I imagined to be thickened and condensed cellular tissue : when it presents this appearance, I need not tell you it would be dangerous to divide the fascia beyond the superficial bands. The patient, then, will be laid horizontally on his face, and an assistant will grasp and extend the leg ; you then feel for the tendons, and, as a rule, the biceps flexor femoris will be found more tense than the semi-membranosus and tendinosus. There are, however, exceptions to this rule. Should this be so, you will pass a small sharp-pointed knife on the inner side of the tendon, and beneath it horizontally, or as nearly so as you can, and as soon as it extends to the breadth of the tendon, turn the sharp edge of the knife towards it, and divide it from within outwards ; that is, from the popliteal space. After having divided the biceps, you will proceed to feel for the tendons of the semi-membranosus and tendinosus, and should they be prominent, pass the knife, on the inner side of the tendons, beneath them, depress the handle, and divide them from within outwards, as in the other instance. You will then examine carefully for any additional source of contraction, as the bands of fascia mentioned ; and if you find them tense, and you can get at them with ease, divide them — but run no risk ; for you must recollect that there is the vein, nerve, and artery, and the possibility of an irregular distribution, and the possibility also of a change in the relative position of the vessels, or of their being included in this mass I speak of ; and although very frequently you will find it an easy matter to divide the tendons of the contracted muscles, and one or more of the clearly-defined bands of fascia, yet in some cases you will experience the greatest difficulty (strange as it may appear) in satisfying yourself that you have even divided the tendons, however clearly defined they may have been, and however positive you may feel that you have passed the knife beneath them. This

arises from the contraction of tissue which will be felt remaining, and in the position of the tendons ; and you may insert your knife again and again, and still feel the chord or chords left, giving you the sensation that the tendon, or a portion of it, still remains. The same remarks apply to the fascia. I would advise you, therefore, to be cautious, and in such cases to rest satisfied with the division of the principal portions, for if you have succeeded in dividing the tendons, you will generally be enabled to bring the leg straight. This applies to simple contraction, without any alteration in the relative position of the bones. If you have also the inward inclination I have spoken of, which can be told by the prominence of the internal condyle of the femur ; and if the tibia is rotated slightly on the femur, which I also mentioned to you, you will generally find it necessary to divide the vastus externus and fascia lata, in the manner described in a former lecture. After having completed the operation, pledgets of lint should be placed over the parts of puncture, sufficiently large to prevent any venous bleeding ; for you will recollect that the popliteal space is filled with loose cellular tissue, and easily admits of effusion of blood, provided a moderate degree of pressure is not carefully maintained. Retain the lint with long strips of adhesive plaster and bandage, and support the leg with a tin splint, bent at the angle at which the leg is contracted. Allow the lint to remain for a week, provided there is no pain, at the end of which time you will find the punctures healed, and all risk of their re-opening effectually prevented. By too early extension, remember, you may irritate the parts of puncture, and be delayed in treatment. We have had one or two cases where a little venous hemorrhage took place internally ; and from proceeding too soon with the extension, inflammation set up around the points of puncture, and the clot, although small, ulcerated out, occupying about six weeks in healing, during which time nothing could be done ; and a patient is now up-stairs in whom I divided the biceps flexor femoris and vastus externus, for knock-knee, which some of you witnessed, where also this occurrence followed, although in a less degree, but occasioned, in like manner, from too early extension ; therefore nothing is to be gained by commencing extension too quickly. I think, however, a week sufficient. In my own practice I always wait that time, and do not consider it prudent to commence sooner, from the quantity of loose cellular tissue occupying the popliteal space. You then apply the means of extension ; and in a simple contraction,

the ordinary splint, with the plate mentioned to hold the thigh down, you will find the most easy method, both for the patient and yourselves, taking care not to proceed more rapidly with the extension of the splint than of the knee, and being guided in your progress by the feelings of the patient. The extension of any joint that has been long in one position is always attended with pain ; and in the knee they will invariably point to the anterior surface of the joint ; so that you must proceed according to the feelings of the patient and the resistance met with, which will of course depend on the original cause of the deformity, and the consequent condition of the joint.

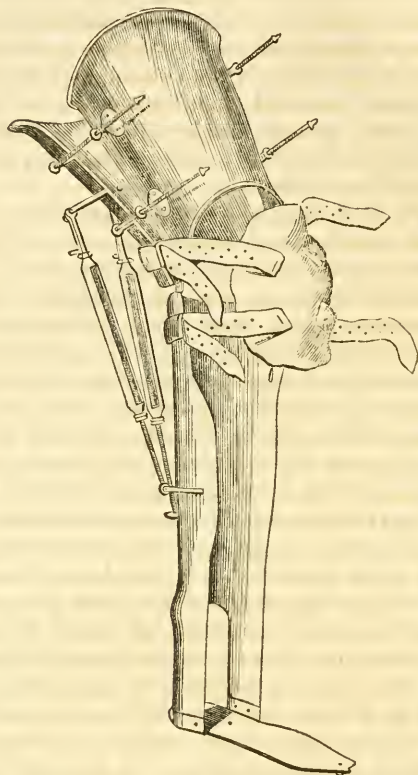
In paralytic and congenital cases. — In cases arising from injury to the spinal chord and column, you will not, as a rule, find much impediment in the joint itself. In cases arising from injuries to the joint, in rheumatic contractions, and in some cases where there has been inflammation of a long and continued character, you will find a greater or less resistance in the joint itself, and of course a more slow and tedious process of extension, and greater care will be requisite throughout the entire treatment. If, then, you have, in addition to the contraction, a lateral displacement, you will find this splint which I had made, and which I have used with great advantage, the best and most simple means to adopt (vide fig. 34) ; it has a double action with the male and female screw behind, as in the former instance, and also at the side, so that at the same time that you are extending the leg, you are removing the lateral displacement.

In either case you proceed gradually and with care, until the leg is brought into a perfectly straight position ; for if you do not, or cannot, accomplish this, rely upon it a relapse will follow from slight neglect. After the leg is brought into the straight position, you will do well to keep it so for some time, until all tendency to relapse is overcome ; *i. e.* until you find it remain in that position when out of the instrument. You then order an upright support, from the hip downwards, which will hold the knee straight, and enable the patient to take exercise, and direct him to exercise the motions of the joint as much as possible, so that the cure may be rendered perfect. The best means of restoring the motion of the joint is by placing the leg in the instrument, and to flex and extend it by means of the screw ; it is a more steady and certain proceeding, and one which is by far the least painful to the patient.

In these confirmed cases of contraction at right angle, or beyond it, the gastrocnemius, from its long flexed position,

does not possess the power or means of being properly extended ; certainly not with exercise. It therefore will be found to have contracted up to the point at which it has

Fig. 34.



The above diagram represents the splints alluded to, which, by its possessing a double action, admits of being applied to any amount of contraction combined with outward inclination of the joint.

ceased to be elongated ; but this will not attract your attention, nor have you the means of ascertaining whether it be so, until you have made considerable progress with the extension of the knee, when the heel will be found contracted at or beyond a right angle ; the patient possessing all the voluntary power, but being unable from the contraction to flex the foot beyond a right angle, or even to that point. Several cases of this kind have occurred at this Charity. I have been compelled after the knee has been straightened

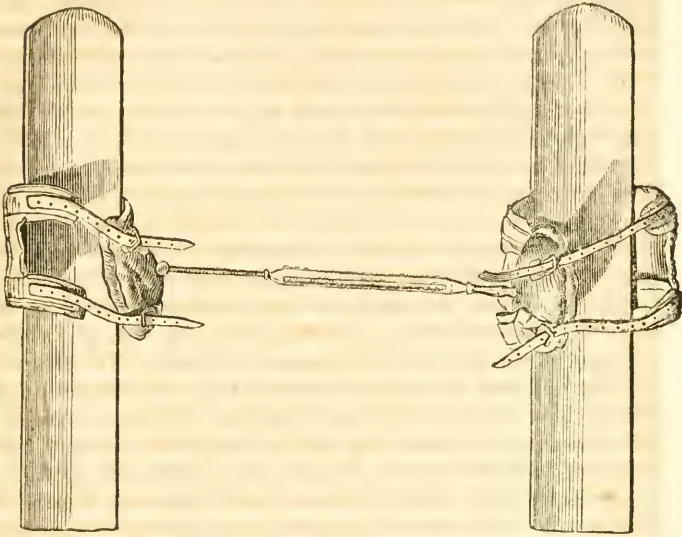
to divide the tendo-Achilles, and in this way the cure became perfected. It is a simple affair, inasmuch as there is no resistance in the joint, nor any great amount of shortening or contraction, and as soon as the tendon is divided, with ordinary care you may flex the foot to its full extent in fourteen or twenty-one days, when the patient possesses the free use of the ankle-joint. Occasionally you will have also contraction of the flexors of the hip-joint, especially if the thigh has been constantly held by the patient flexed upon the pelvis. This is a much more serious and difficult complication, for after you have straightened the knee the patient does not possess the power of standing erect; because if the back is straight and in the perpendicular position, the thigh flexed more or less acutely, the leg is thrown forwards, and if the leg is in the perpendicular position, the pelvis is thrown backwards: this proceeds from the yielding of the lumbar vertebræ, they being drawn by the *psoæ* muscles, so that great difficulty and inconvenience are experienced when the patient attempts to walk, together with great lameness, giving the appearance of a person afflicted with disease of the hip-joint. In this instance the principal muscles contracted are the *psoæ*, and it is a difficult and dangerous proceeding to divide them, although I believe it has been done by Stromeyer. I would advise the following proceeding:— Let the patient lie flat on his back, with his legs off the edge of the bed, a pillow being placed beneath the lower part of the back, so as to raise the pelvis above the level of the rest of the body: of course, as the thigh is contracted, the leg will be considerably above the level of the body: then attach a weight with a band just above the ankle-joint, and direct this to be done as long as the feeling of the patient will admit, two or three times daily, increasing the weight by slow degrees. In this way a stretching is kept up in the *psoæ* muscles, which will, by perseverance, relieve, although it will not remove the contraction, and enable the patient to get about much better than he could otherwise have done.

Forcibly extending the thigh several times a day with the hand is also beneficial, by getting an assistant or domestic to hold the pelvis as firmly as possible, whilst another with considerable force presses the leg downwards: should you find the *rectus*, *sartorius*, *tensor vaginæ femoris*, contracted, as well as the *psoæ*, divide as many of them as can be done with safety. The method of doing this I shall point to you when I come to speak of contraction of the hip-joint. Occasionally, also, you will find the thigh not only flexed but

adducted, so that when the leg is brought into the straight position, it is thrown over its fellow. One case is now in the wards, where this condition exists in both thighs, both knees being contracted, with the general spasmodic condition of all the voluntary muscles. If it exists in both limbs, you must as soon as the knees are restored to their straight position commence extension, either with or without section of a portion of the adductors. This may be done in two ways, either by fastening a bandage at the side of the bed, and passing it round the thigh on each side, or else by means of this instrument, (*vide fig. 35*), which I have had made for the express purpose. The first method is the most simple and efficient: although only one thigh should be affected, you must still fasten a bandage round each of them, to enable you to act on that which is contracted. In this way you will be enabled to remove the contraction sufficiently to enable the patient to use the limb with comparative freedom; you must, however, keep up this extension night and day, as in other instances, and when the thighs are sufficiently apart to enable the patient to sit astride in a chair, let them adopt this method several times a day, sitting with their faces to the back of the chair, upon which they can rest their arms. I must not forget to call your attention to another complication occasionally met with, and which I partially alluded to, namely, displacement of the tibia backwards (*vide figs. 30 and 32 of last lecture*): this sometimes takes place to a great extent, and you have no means that I am acquainted with of remedying it during the time you are extending the leg; you may perhaps do so in part, but not altogether. When this deformity exists after you have straightened the limb, you will find the condyles of the femur projecting to such an extent, as to press almost entirely on the anterior edge of the articular surface of the tibia; in fact, it looks just as you may imagine a dislocation of the tibia backwards would look. And in one case, a girl of 19 years of age, (*vide fig. 30 of last lecture*), who was an in-patient of the Charity, when the leg was straightened this was the actual condition, and as far as I could discover, the articular surfaces did not touch at all, the head of the tibia appearing to have receded behind the condyles of the femur into the popliteal space; the condyles themselves projecting abruptly, and giving the knee a most curious and unnatural appearance, and rendering it perfectly impossible for the girl to have borne the weight of the body on the leg without forcing the tibia still higher up. It was, in fact, a complete dislocation of the tibia backwards. There must

have been an immense elongation of the crucial ligaments, similar to that represented in the diagram (fig. 32) of last lecture; and were it not for the successful termination of

Fig. 35.



The splint represented in the above diagram consists of two horizontal portions, having in the centre of each a moveable pad, made concave internally, to correspond with the convexity of the inner side of the knee-joint. These pads are united by means of a male and female screw, which allows of their being brought closely together. Straps are attached to encircle the knee, so that it may be fixed in the position desired. By gradually elongating the screw, the legs are insensibly separated to any extent.

the case, I should have thought they had been completely obliterated. It is the only case I have witnessed to such an extent, although it is by no means uncommon to find this disarrangement partially existing; in whatever degree, it must be remedied, as the exercise of the limb in this position must, mechanically, increase the deformity, and occasion a return to the malposition, independently of the perfect impossibility of the natural motions of the joint being restored. The means I have adopted, and which perfectly succeeded in the severe case alluded to, and with comparative ease to the patient, consisted of a bandage passed beneath the pelvis on the inner side of the thigh of the contracted leg, well padded and fastened to the head of the bed, the patient lying in the horizontal position on her back.

The foot and leg were then carefully bandaged, and the instep padded. A strap was then passed, in the figure of 8 form, from above the ankle and over the instep, which strap was attached to a bandage fastened at the bottom of the bed, a board being fixed there perpendicularly, so that the leg might be slightly raised above the level of the bed. By these means extension was gradually kept up, and as soon as I imagined the head of the tibia was brought down parallel with the extremity of the condyle of the femur, I applied a straight splint behind the leg, extending some distance above and below the knee, padded at each extremity, and fixed by means of straps. A broad webbing strap was then applied just above the condyles, passing round the splint, and was gradually tightened, which, by its action, tended to draw the condyles of the femur backwards, whilst the counter-pressure of the pad and splint below the knee, behind the upper portion of the tibia, had a direct effect to force the tibia forwards. This it effectually did, and without putting the patient to any amount of pain. This, therefore, is the plan I adopt, and which I should advise being followed in all cases of this description. It possesses several advantages—simplicity in its application, certainty in its result, and it does not unnecessarily confine the patient, or occasion any undue pressure, with ordinary care. If they move out of the straight line, so much the better, as it increases the amount of extension, and assists the cure. We have had, in one case of a female who possessed that unhealthy, fat, flabby condition occasionally met with, phlegmonous erysipelas set up, resulting in sloughing of the cellular tissue at the back of the thigh. The patient had complained of little pain; but on one occasion, when I visited her, I found the pad damp behind the knee, when removing the instrument and bandage; the skin presented that reddish-brown indurated appearance which is so characteristic of this disease, together with bullæ here and there disseminated. I immediately made a large opening at the back of the leg, and let out a large quantity of sanious matter and sloughed cellular tissue. Poultices were applied, and the limb supported throughout, together with the administration of opium, stimulants, and nourishment of every kind; and the girl perfectly recovered from the effects. The leg was afterwards straightened, and she left the Charity with a useful limb.

I have thought it necessary to go thus into detail, as I know of no cases of contraction that are likely to give you more trouble, or occasion more anxiety, as you will scarcely ever

meet with two alike ; and without the greatest care all your efforts will be frustrated. The causes vary so much, not only *per se*, but in their effects, that in proportion to the change that has taken place in the joint itself, or in the synovial membrane covering it, will be the difficulty attending the treatment. These changes, unfortunately, cannot be accurately ascertained. You may, with the directions I have given you, form an opinion ; but this, as in every disease met with, must sometimes be erroneous ; for occasionally we cannot foretell what, or if any, adhesion exists in some cases ; neither can we tell the precise condition of the synovial membrane and ligaments. In fact, there are no cases in the range of deformity so difficult, tedious, and embarrassing as these.

It is a curious circumstance, and one that I am unable to explain, that the pain these patients complain of is always on the point of the knee, in one spot, and not diffused over or through the whole joint, as we should *à priori* have anticipated, whether the knee is contracted in the straight or flexed position. The time occupied in treating these deformities will vary, according to the age of the patient, the cause producing it, and the length of time the affection has existed. In cases arising from punctured wounds, I have succeeded, contrary to what I should have anticipated, in restoring the position in six or eight weeks. In cases arising from scrofulous disease about the joint, in three or four months. I am speaking of adult cases. In younger subjects, after the operation, it can be done in six or eight weeks. In cases occurring from rheumatism, from three to six months, or nine, as this of all the causes appears to destroy the integrity of the joint the most rapidly, and to cause it to become irremediable in a comparatively short time ; so that no delay should take place in the treatment, provided treatment is decided upon. In these, as in all deformities, never omit artificial support, until the balance of power is restored between the flexors and extensors, as, if you do, whichever may preponderate in power will, from my experience, certainly become contracted, and occasion a permanent condition of one of the motions of the joint.

LECTURE IX.

CONTRACTION OF THE KNEE-JOINT IN THE STRAIGHT OR EXTENDED POSITION — CONGENITAL — NON-CONGENITAL. CASE OF CONGENITAL CONTRACTION OF THE THIGHS, KNEES, AND FEET. CAUSES OF NON-CONGENITAL CONTRACTION: INJURIES TO THE JOINT — POSITION — CHRONIC INFLAMMATION. TREATMENT: SURGICAL AND MECHANICAL — DIVISION OF THE RECTUS FEMORIS. CONTRACTION OF THE HIP-JOINT — CONGENITAL — NON-CONGENITAL. CAUSES OF NON-CONGENITAL: CEREBRAL OR SPINAL IRRITATION OR DISEASE — INJURIES TO THE SPINE — POSITION — RHEUMATISM — IDIOPATHIC INFLAMMATION. TREATMENT: MECHANICAL — SURGICAL AND MECHANICAL — SECTION OF RECTUS FEMORIS, OF TENSOR VAGINA FEMORIS, AND ADDUCTOR LONGUS. MODE OF PERFORMING THE OPERATION.

I HAVE now, gentlemen, to point out to you another contraction of the knee-joint, viz. contraction in the straight or extended position, — the patient suffering from what is called “stiff-knee.” This is a very rare condition of the joint, but is nevertheless both congenital and non-congenital. I have met with but one instance congenital, and that in an infant three months old, in whom the thighs were also contracted in the flexed position, and the feet both contracted, the one in the form of talipes varus, the other of talipes valgus; the latter, however, differing from valgus, inasmuch as the anterior half of the foot, that is, from the astragalus, was abruptly everted, and fitted completely in the concavity formed by the foot affected with varus — vide fig. 36. The thighs being flexed upon the pelvis, the knees extended, and the feet thus contracted, were kept constantly lying on the abdomen, chest, and face of the little patient; and when the leg or legs were forcibly drawn down, they returned with an elastic impulse to their contracted position. It is the only case of the kind I have met with, but it is confirmatory, in my opinion, of the cause I have so often stated to you of those congenital contractions which exist without cerebral disease, or without malformation of parts, namely, position *in utero*. This child was born with the breech presentation, and had evidently, during its uterine existence, possessed very little, if any, power of moving the lower extremities out of the position in which they presented themselves, and which position would certainly

adapt it to the smallest possible space it was capable of being placed in. There was no malformation, or any evidence of disease existing, or having existed, in the nervous

Fig. 36.



An illustration of congenital contraction of the feet, knees, and hips, as described.

system. The child was of the usual size, and perfectly healthy in every respect, so that I can assign no cause excepting the one mentioned. With regard to the non-congenital, you will generally find that it arises either from disease or injury to the joint. In the cases I have met with, chronic inflammation of the joint has been the original cause, producing in the first instance contraction in the flexed position, which, however, has been removed by the gradual extension kept up by means of a tin splint, before the contraction had become permanent; and when removed, the joints have been kept constantly in the extended position, and thus terminating in contraction of the extensors, which is most evident; so that it appears that muscles have not the power of retaining their proper functions if kept constantly at rest, but become rigidly fixed up

to the point at which they have ceased to be elongated or drawn out, no matter what muscle or set of muscles may be so circumstanced, whether the extensors or flexors, &c. &c. ; but although they might appear to be permanently shortened, yet I believe that no change in their structure takes place beyond the rigidity mentioned, and a want of development occasioned by their passive condition ; and the cases mentioned in the early part of the course are conclusive testimony of this being the fact.

The cases that have presented themselves arising from injury to the joint have terminated in ankylosis, and of course have become irremediable. In one case, however, the adhesion was ruptured by force, and the leg flexed to about two-thirds of a right angle ; afterwards slowly extended ; but it occasioned great pain, and ultimately became fixed in its original position ; so that I have not much to say on this cause. Patients thus afflicted are, as you must perceive, in a much better condition than those who suffer from either of the contractions before mentioned, but are nevertheless exposed to much inconvenience and considerable lameness ; as in the act of progression the leg affected is thrown or carried round, forming almost a semi-circle on each step taken, the only means the patients possess of walking with any degree of comfort ; for if they attempt to carry the leg straight before them, they are constantly liable to trip or fall from any slight impediment that they may happen to meet with ; and, of course, any very active employment can scarcely be followed.

Treatment. — The treatment, in these as in the other contractions, will consist of mechanical solely, or surgical and mechanical, according to the rigidity met with, and the length of time the contraction has existed. In the congenital case just mentioned, after operating upon the feet and removing the contraction, I first, and for three months, attempted to flex the knees by mechanical means. The left knee yielded to that treatment ; the right remained much in its original condition. I could flex it, and keep it flexed, during the time the instrument was on, but upon removing it the leg was instantly extended, and remained so. I therefore determined to divide the rectus, which I did in the following manner. The leg was forcibly flexed, and held so by an assistant, the child lying on its back : I then introduced a small sharp-pointed knife on the inner margin of the rectus, about an inch and a half above the patella, and as soon as I imagined the point of the knife was parallel with the under surface of the muscle, I de-

pressed the handle, and passed it beneath as far as its outer edge, then turned the sharp edge towards the muscle, and divided it transversely from below upwards. A pledget of lint was applied over the point of puncture, and secured with strapping and bandage: this was allowed to remain for a week, at the end of which time the puncture was healed, and the instrument re-applied (consisting of a simple spring, having attached at each extremity a circular band,—the one for the leg, the other for the thigh, and secured by means of a strap and buckle being applied beneath the joint); extension was again kept up, and in fourteen days the leg was flexed to a right angle with great ease; so that I should advise your adopting a similar course in a case of this description, as it is evident that the sooner the contraction is overcome the better. No ill effects followed the operation, nor apparent inconvenience; and the result has been most satisfactory.

In cases arising from disease in the joint, provided you can flex it without great force, I would advise your adopting the mechanical means alone, which you will do in the following manner. Let the leg be placed and secured in a splint, similar to that mentioned for contraction in the flexed position, with the metal plate in front of the thigh as well as behind, and one also to cover the anterior surface of the leg. Then, with a male and female screw attached behind, gradually flex the leg—more or less rapidly, according to the feelings of the patient—and when it is flexed to or beyond a right angle, let it be extended again: as soon as this is accomplished, direct the patient or friends to flex and extend it alternately once or twice daily, until free motion is obtained, when the screw should be removed, to allow of the patient exercising voluntary motion, as much as can be done twice or oftener daily, after which, let the screw be re-attached, and retain the joint during the night, and also during the intervals of exercise, in the semi-flexed position, so that neither set of muscles shall regain a preponderance of power; for you must always bear in mind that there is a constant inclination or tendency to contract, if a preponderance of power exists. As soon as the patient can flex and extend the joint voluntarily, let the instrument be removed for a portion of the day, and let exercise be taken: in this way you will effectually remove the contraction: do not, however, omit the use of the instrument until all tendency to contraction is overcome, for rely upon it, should you do so, a return of the contraction will follow. A case occurred

to me, some time since, of a gentleman, aged about 20, which had arisen from inflammation in the joint, followed by contraction in the flexed position: this was removed by the application of splints, and the patient was ordered to keep the leg constantly extended: this he had followed up for two years, at the end of which time he consulted me, when I found the rectus rigidly tense, and any attempt to flex the leg with the hand futile. I applied the splint mentioned, and kept up constant extension upon the muscle, and in three weeks succeeded in flexing the joint to a right angle: I then re-extended the joint, and proceeded in the manner described, until he could voluntarily flex and extend it very nearly to a right angle. He became, however, impatient, and left town, promising to persevere at home: I have since heard he has made but little progress, and in all probability the joint will return to its original condition. Of course the moving of a joint which has been for a long time in one position is attended with some pain, and requires the greatest possible perseverance, both on the part of the medical attendant as well as on that of the patient, for unless the treatment is most unremittingly followed up, there is little prospect of a cure being effected.

In cases that have arisen from adhesions in the joint, when the joint is immoveable, and when upon forcibly attempting to flex it no pain is experienced, I would not advise your having recourse to any means of restoration, as the patient possesses a limb that is comparatively useful, although limited in its motions, whereas, if you rupture the adhesions, the probability is you will not eventually improve the condition of the patient—at least, I have not seen any permanent good arise from such treatment: although you may succeed in flexing the joint for a time, yet the chances are that it will return to its former state, as it can scarcely be expected that the secretory surface of the synovial membrane, or that of the ruptured extremities, will assume a condition compatible with free motion.

With this, gentlemen, I conclude the contractions of the knee-joint, and shall now proceed to one scarcely less difficult or less important namely—

Contraction of the hip-joint.—Contraction of the hip-joint is both congenital and non-congenital, and will be found either to consist of contraction in the flexed position simply, or, as is most frequently met with, *flexed* and *adducted* combined.

The only case that I could distinctly trace as being con-

genital was that I have just now related (vide fig. 36), although some cases were stated to have been congenital, in which the general spasmodic condition also co-existed; in that case, however, the contraction was confined to the flexors almost entirely. The thighs, it is true, were held in contact, but could be easily separated, and would at times remain so; but from the little patient possessing no control over the extensors, no opportunity was presented for its abducting the thighs: since the contraction of the knees and feet has been removed, the thighs are moved in either position by the voluntary effort. I have not met with a congenital case in the adult or youth, so that, if it has occurred, in all probability the weight of the extremities, and the constant extension the thighs would naturally be subjected to, have overcome the contraction.

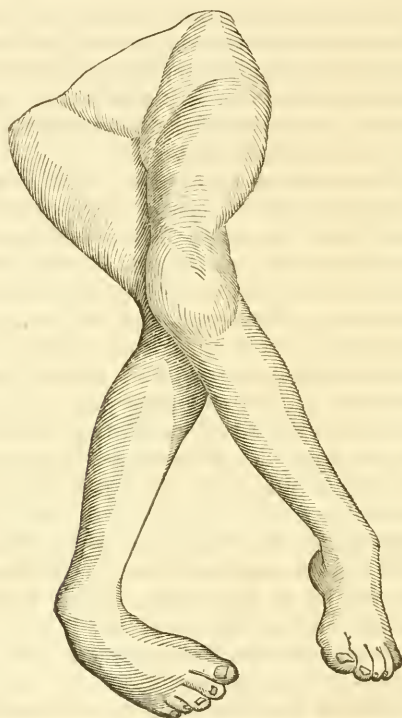
The non-congenital arise from cerebral or spinal irritation, injury to the spine, position from strumous disease in the hip-joint, or its neighbourhood.

In the cases arising from cerebral or spinal irritation, you will find either paralysis of one or more muscles, especially of those below the knee, and which are generally the extensors of the legs and flexors of the feet; for you will perhaps never meet with the contraction from this cause, without contraction of the knees and feet also, of one or other of the forms I have mentioned to you; or else a general spasmodic condition of the muscles, affecting the lower extremities solely, or as is most generally the case, a spasmodic condition of all the voluntary muscles, and I may add also, a contraction of the adductors combined, as an invariable consequence; the one leg being thrown and retained constantly over its fellow. A case now in the Charity illustrated this most fully, for, when admitted, both thighs were retained, as many of you must have seen, in their extreme amount of adduction, which, with the contraction in the knees and feet, gave the boy more the appearance of some hideous malformation. In these spasmodic cases, then, you have, in addition, contraction of the knees in the flexed position, combined with talipes varus of one foot, talipes valgus of the other (vide fig. 37); the lower extremities being perfectly useless, but without any disease or disorganisation of the joints themselves, as also in the congenital contraction.

In cases arising from injury to the spine, paralysis is the immediate result, upon recovery from which the knees and feet will be found very generally to have become contracted. From the constantly flexed position the thighs are kept in,

to enable the patient to swing himself between two crutches, contraction of the flexors takes place, so that after the deformity has been removed in the knees or feet, the thighs will be found contracted, and of course present a great obstacle to the patient walking with any degree of comfort. I attended a gentleman eighteen months since, for contraction of the knee-joint in the flexed position, which had existed since his infancy. After restoring the leg to the straight position, I found, on his attempting to use it, that the flexors of the thigh had become contracted, solely from

Fig. 37.



Example of contraction of the thighs in the adducted and flexed position, combined with contraction of the knees and feet. The feet, however, in this instance, were both contracted in the form of talipes varus. In the case from which this cut was taken, all the voluntary muscles were spasmodically affected.

that limb having been kept flexed, to enable him the more conveniently to move about with the assistance of a crutch.

In rheumatic inflammation affecting the joint, unless the

means employed give speedy relief, and cut short the attack, a change in the secretory surface of the synovial membrane quickly takes place; adhesions are formed, and perfect ankylosis results; so that, as in the knee, unless the patient presents himself within a short time from the termination of the acute attack, you will in all probability be unable to adopt any means which shall produce a beneficial result.

Idiopathic inflammation of the hip-joint assumes a more rapid, violent, and destructive character, than in any other joint; for, in a few hours, a patient attacked with it suffers from disorganisation, to a greater or less extent, of the cartilage of the acetabulum or head of the femur, producing, if not contraction, a grating sensation from disorganisation, which frequently terminates in the hardened ivory condition of that portion of the cartilage which has thus suffered, and if the patient is confined long with the attack, contraction of the flexors and adductors results; for in this instance, as well as in all others, the position instinctively maintained during the attack will be that which occasions the smallest amount of pressure in the articular cavity; and it must be evident that no one could effect this so completely as the adducted and flexed, as the body of muscles acting on the thigh-bone are by this means kept in a relaxed state, and the extensors of the thighs, powerful as they are, become and continue relaxed and passive by the same instinctive efforts which occasion contraction of the flexors and adductors; for if they act at all, they can only do so by first fixing the head of the femur on the acetabulum, which must irritate and increase the inflammatory condition of the joint, and of course add to the pain from which he is already suffering.

The last cause I shall have to mention is strumous disease in the joint, or the neighbourhood of the joint; most frequently in the joint itself. This cause is as serious, if not more so, than either of those mentioned, as it but too frequently terminates in the destruction of the articular cavity, and ligaments connected with it; oftentimes also of a considerable portion of the bones surrounding the joint, as well as of the head of the femur itself, producing a change in the relative position of the bones; and upon the subsidence of the diseased action, contraction of the flexors and adductors will be found together with more or less shortening of the entire limb from the loss of substance, and from the displacement of the head of the bone, which, as a rule, will be found on the dorsum of the ilium, and from the length of time occupied by the restorative process

in this affection, under the most favourable circumstances, the contraction becomes proportionably rigid, and will require the greatest care and attention in the treatment. In cases arising from either of the causes mentioned, the nates will be flattened, from the atrophied condition of the muscles which have remained passive ; and in each, with the exception of the last, the trochanter major will be found in its proper relative position, admitting of free motion in every direction, as far as the contracted muscles will admit of, provided the integrity of the joint is not disturbed. In the last cause, however, you will not only find the nates flattened, but the trochanter major, from the displacement which has happened, project, and of itself, present a deformed appearance.

Patients suffering from this contraction are rarely able to use the extremity without the assistance of crutches, and if the contraction exists to a right angle, the leg becomes almost useless ; if, however, the contraction does not exist to so great an extent, they can get about, by placing the toes on the ground, and by the yielding of the lumbar vertebræ, or by wearing a high-heeled shoe ; in either case great lameness and inconvenience is the result, and very frequently contraction of the knee, or of the heel is a consequence. In those cases of contraction which have arisen without disease in the joint, the only method of walking is either by the head and chest being thrown forward, or by the yielding of the lumbar vertebræ producing lardosis, the nates projecting, so that under any circumstances they are subjected to greater inconveniences than by most of those contractions previously mentioned.

Treatment. — The treatment consists of mechanical, or surgical and mechanical, and, in incipient cases of disease in the joint, local and general means also.

In incipient cases arising from disease in the joint, it has been recommended that two or three years should be allowed to elapse before any attempts are made to remove the contraction. This, from my experience, is unwise and unnecessary, if it is not directly injurious to the patient, which I believe it to be. The plan I have adopted, after the active symptoms of the disease have subsided, is to keep up a constant steady extension, to such an extent only as will not admit of the patient suffering from pain, which can be done at the same time that the general health is being attended to, and any local irritant applied, should it be thought necessary. In this way not only is the contraction prevented from becoming confirmed, but the re-

storative process is assisted by the limb and joint being kept at rest, or nearly so ; for it is evident, one of the most certain means of adding to the diseased action already in existence, is by allowing motion of any kind to take place, excepting that only which is of the most passive nature. In these cases, then, I would advise your having recourse to an instrument I have had made, similar to that represented in fig. 38, which, by its fixing the pelvis, and being also attached by the broad webbing strap

Fig. 38.

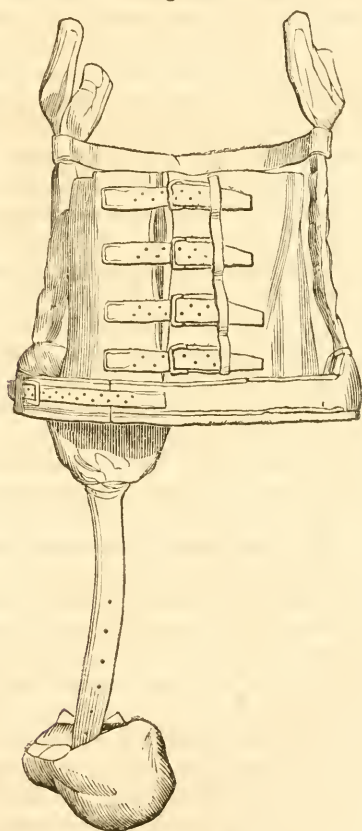


Diagram of the instrument alluded to for the reduction of contraction of the hip-joint.

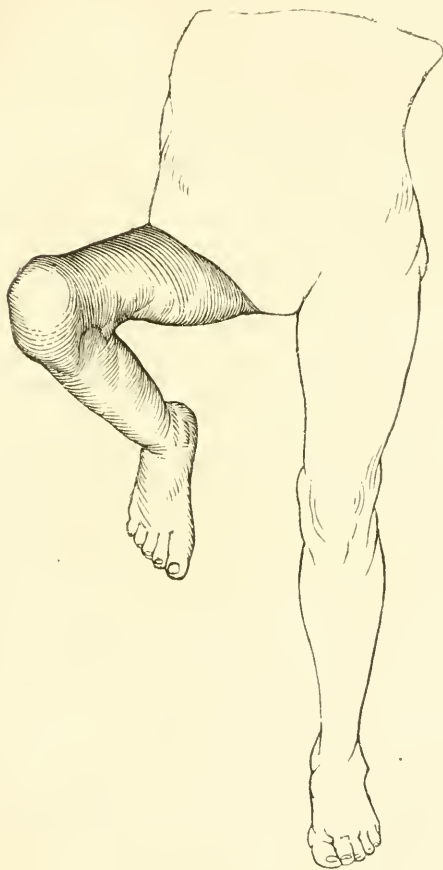
to the chest and abdomen, will enable you to keep up any amount of extension on the thigh, first bandaging the foot, leg, thigh, and hip, with a flannel roller ; for, as I men-

tioned to you when speaking of scrofulous disease of the knee-joint, unless the natural temperature is kept up, the restorative process cannot go on.

In cases occurring in the poorer classes, whose means do not allow of their procuring an instrument, I have had recourse to a straight board, corresponding with the size of the back, with an extended portion to correspond with the thigh contracted, webbing straps being nailed on each side of the board, so that the abdomen, chest, and pelvis, may be secured tolerably well: of course a pad must be used, to prevent any undue pressure being made. With this I have succeeded in bringing down the thigh, and preventing a contraction from taking place. You cannot, of course, restore any amount of motion, and your attention must therefore be directed to bringing the thigh straight with the pelvis, which enables a patient to use the leg with comparative ease, and without the use of crutches. In young subjects, provided the disease has subsided, and a short time only has elapsed, the contraction may, as a rule, be removed without an operation, but if in the course of extension any of the superficial muscles are found to be rigidly tense, a division of them had better be effected. In the older subjects, and when the disease has ceased to exist for any length of time, although the new matter may not have become consolidated, you will find the contraction rigid, and scarcely, if any, perceptible motion can be discovered; you must then be guided by the rigidity of the muscles themselves, as well as by the patient complaining of pain upon forcible extension being kept up; for so long as there is no ossific union you may on all occasions relieve, if not remove, the contraction. A case of this kind was some time since admitted into the Charity, in which the thigh was contracted to a right angle with the pelvis, and the boy could not use the limb in the least (*vide fig. 39*). No motion or trace of it, could be discovered by the use of great force. It was proposed to saw through the neck of the thigh bone (*Dr. Barlow's operation, of Philadelphia*), and the father of the boy assented to its being done. I examined him, however carefully and repeatedly, and adopting the course I have recommended to you, namely, the keeping up of forcible extension for some time, when a doubt exists of ankylosis having taken place, I found the rectus, tensor vaginæ femoris, and adductors, continue rigidly tense, which they would not have been, had the ankylosis been perfect, for in that case they are perfectly relaxed: I therefore proposed that the division of as many

as possible of the contracted muscles should be first tried, as in the event of that not succeeding, the patient would be in no worse condition than he was before : accordingly, this was done. The rectus, adductor longus, and tensor

Fig. 39.



An illustration of contraction of the hip-joint at right angles, taken from a patient about 16 years of age. The contraction had arisen from disease in the joint, which had also resulted in displacement.

vaginæ femoris, were divided, and after the punctures had healed, extension was kept up by the instrument represented in fig. 38, when I had the satisfaction of finding the thigh yield about half ; and although I failed in bringing it into the straight position with the pelvis, yet it was so far

reduced that the boy could get about comfortably with a stick, whereas previously his only means of locomotion was with crutches. So that in these apparently hopeless cases great good can be effected.

The mode of performing the operation is as follows :— Let the patient lie on his back, and first feel for the front edge of the tensor vaginæ femoris, then introduce a long sharp-pointed knife to its inner side, and as soon as you have carried the knife as far as the breadth of the muscle, turn the sharp edge towards it, and divide it from outwards. You then proceed to the division of the rectus in the following manner : introduce a sharp-pointed knife on its inner margin, at about an inch and a half from the pelvis, pass it perpendicularly downwards, and when the point is parallel with the under surface, depress the handle, and carry the knife horizontally beneath it from within outwards, and divide it transversely from below upwards. The division of the adductor longus will require great care, as although it is rendered prominent by the contracted state, yet it is in close proximity to the femoral vessels, and unless the greatest precautions are taken, risk is incurred of puncturing them. The mode I usually adopt is as follows : direct an assistant forcibly to abduct the thigh, so that the tension may be increased ; then with a small scalpel puncture the fascia as nearly as possible to the *outer* edge of the muscle, carrying the knife directly downwards upon it ; then introduce a blunt-pointed knife, pass it beneath, and as nearly as possible horizontally across from without inwards, *i. e.* towards the skin on the inner side of the thigh, turn the sharp edge towards the muscle, and divide it. By this mode you run no risk of puncturing an artery : the complete division of a small branch would be of no moment, as a compress and bandage will effectually control it : you cannot, however, exercise too great caution. After the division, place pledgets of lint over the points of puncture sufficiently large to prevent any venous bleeding, and secure them with strapping and bandage, which you should allow to remain for a week. Afterwards apply the instrument mentioned, and proceed with the extension as rapidly as the feelings of the patient will admit of. Occasionally you will find only one of the muscles mentioned tense, which of course simplifies the operation. In those cases of contraction which arise from cerebral or spinal irritation or disease, and in which the knees and feet are also contracted, I would advise your operating first on the knees and feet, and when their normal position is restored proceed with

the thighs. In some, however, you will be compelled, from the great amount of contraction of the muscles of the thighs, to abduct them before you can conveniently follow up the after treatment of the knees or feet. In the case I mentioned to you, now in the wards, it would have been impossible to have treated the knees or feet without first abducting the thigh, which was therefore the first step in the treatment, and the boy now has his limbs restored to their natural position. You will therefore be guided according to circumstances. In the slighter cases of contraction, which exist without disease in the articulation itself, you may proceed in the manner described in my last lecture, without operation.

After the leg is brought into the straight position, in cases in which actual shortening of the entire limb exists, let the patient have a boot with a raised sole, made to correspond with the fellow limb, and raised equally from the heel to the toe, when possessing the free use of the ankle and knee joints, they will be enabled to get about with comfort. In the spasmodic cases, supports from the hips downwards are absolutely necessary to prevent a return to the malposition, and also to enable the patient to take exercise. You will be surprised to see how much better the milder spasmodic cases can walk than could reasonably have been anticipated, although the spasmodic condition of the muscles still exists. A patient lately in the Charity, about 14 years of years of age, in whom I divided the adductor longus in each thigh, the flexors of both knees, and the tendo-Achilles in each foot, is now walking with comparative ease, and has much improved since he left the Charity. So that although these are perhaps as little encouraging as any case of deformity you may meet with, yet your efforts must still be directed to do as much as the case admits of, which, to the patients themselves, is not thought insignificant, from the comparative comfort with which they are enabled to move about.

LECTURE X.

RACHITIS; TRUE — CONGENITAL — NON-CONGENITAL — FALSE.
NON-CONGENITAL — TREATMENT.

I SHALL now, gentlemen, proceed to the consideration of rachitic curvatures of the bones, of which so large a proportion of cases present themselves at this Charity. By the term Rachitis is understood a softened condition of the bones of the extremities, or of the bones generally; and almost all the authors who have written on this subject include under this head curvature of the bones, whether arising from disease which affects the general health and constitution of the patient, whereby the bones are not only softened, but also altered in size and form, the disease influencing the growth and development of the bones, and those cases, of which so many are to be seen, of simple curvature of one or more of the bones of the lower extremities, which exists without any other alteration in their relative or normal proportion; the one being totally different in cause and effect from the other. I would therefore confine the term rachitis to that condition in which there is evidence of disease affecting the bones and body generally; and *false* or *spurious* rachitis, to that condition in which a simple curvature exists without any other change or alteration.

By “rachitis,” then, you will understand that diseased and softened condition of the osseous system generally, which has for its results not only a curvature of one or more bones, but an actual change in their relative proportions; this change being a diminution in length, with an hypertrophy in size. It is both congenital and non-congenital. Cases are mentioned by Hippocrates of congenital rachitis, and also by others; so that it has been known and recognised from the earliest history of surgery. I have been fortunate enough to meet with a specimen in a seven months’ fœtus, of which this is the skeleton; and you will observe that the long bones of both the upper and lower extremities are about twice their natural thickness, and about a third, or perhaps more nearly one-half, shorter than natural; that the tibia and fibula of both legs are curved severely, the fibula outwards, the tibia inwards; that the radius and ulna of both upper extremities are also curved outwards and inwards; that the ilii and scapulæ are enor-

mously hypertrophied, and the head, as is usual, very nearly twice the natural size; the parietal suture ankylosed at its middle third, and talipes varus of both feet (vide fig. 40). The extremities of all the long bones greatly enlarged, having more the appearance presented in the skeleton of the elephant. There does not appear to be a deficiency of earthy matter, but there evidently is a want

Fig. 40.

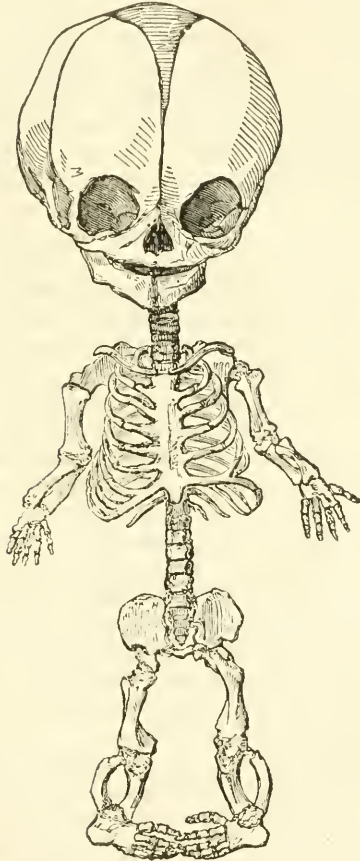


Illustration of congenital rachitis combined with talipes varus of both feet.

of cohesion between the earthly particles, as if the cellular tissue itself did not possess the power of retaining in apposition, that is, the close apposition, which is common to the healthy bone. In this instance the parietal bones, as stated,

were partly ankylosed. In this subject tubercular matter was freely deposited in the liver and other organs, and also on the inner side of the sternum, as may be here seen. [The preparation was here shown, together with the liver.] I have not been able to trace the history of the parents, which renders it somewhat incomplete, although no doubt exists in my mind of its being hereditary.

In this affection, then, you will have, combined with curvature of the bones, a generally diminished stature, and very frequently the evidence of tubercular disease, with which it appears to be, as far as my observation goes, almost invariably connected; for in those instances that have presented themselves at this Charity, that peculiar diathesis common to tubercular disease has been most apparent. In this cast, taken from a patient 18 years of age [exhibiting it], who was afflicted with severe knock-knees, with curvature of the bones of both the upper and lower extremities, and flattening of the ribs, the only organ that appeared at all approaching the natural size was the organ of generation, which appears in these cases to retain its full vigour; for I believe that consumptive patients are not deficient in the power of reproduction. In these cases the softened condition of the bones is confined to children under five years of age, for after that period, although the bones never possess their normal proportions, yet they become as hard as the healthy bone, and in some instances are stated to be actually stronger; as, if the curvature is not removed in childhood, a deposit of bony matter takes place at the weakest point, namely, the concavity of the curve, which renders them capable of bearing great weight; and if the individual has been subjected to much muscular exertion, and possessed good health, they are enabled to undergo quite as much, occasionally greater, bodily exertion, than an individual who has not thus suffered. This, however, is the exception, for unfortunately many fall victims to the diseases of childhood and puberty.

In cases which have not been noticed during the first months of existence, but in whom the bones becomes curved afterwards, you will find the curvature generally forwards, or forwards and outwards, of the tibia and fibula; forwards and inwards, and with which is invariably connected knock-knees more or less severe, with the most severe form of talipes valgus, arising partly from the curvature of the bones, and also from the general debility from which the patient suffers (vide fig. 41); outwards of the femur; outwards and inwards of the radius and ulna, occasionally so acute, that

you will with difficulty reconcile the possibility of its being a simple yielding of the bones, but will at first sight regard it as a badly united fracture ;—flattening of the ribs, with

Fig. 41.



Diagram taken from the cast of a child, aged 10 years, in whom every bone appeared more or less curved, with a generally diminished development, attributed by its parent to the effects of denition.

the prominent and projecting sternum ; occasionally the cartilages of one side of the sternum projecting much beyond that of the opposite side, the patient having what is termed the “pigeon breast.” Not unfrequently, also, lateral curvature of the spine, from the same cause, and of which I shall speak when I come to that subject. The general health impaired, indicated by the pallid aspect, emaciated

and flabby condition of the body generally; morbid appetite; irregular bowels; enlarged tumid abdomen, symptomatic of the existence of mesenteric disease,—in fact, a concentration of ills scarcely to be met with in any other disease.

This affection is unquestionably, as I have said, constitutional, but is aggravated, and frequently brought into activity, by dentition, the febrile diseases to which children are subjected, worms, and with bad insufficient diet, deficiency of clothing, &c. &c. They become, in fact, from these causes, as well as from the predisposition to disease, liable from any slight casualty to suffer locally or generally, and are the frequent subjects of strumous disease of the joints, and what is termed “Pott’s disease,” with angular curvature of the spine.

I regard, then, common curvature of the bones of the lower extremities, without that general rachitic condition of which we have just now spoken, as totally different both in its cause and effects, and have therefore ventured to designate it by the term of spurious or false rachitis, and am of opinion that it may exist without any evidence of ill health, although the irritation consequent on dentition, as well as any of the causes mentioned, which so frequently interfere with the health of a child, certainly predispose them to a softened condition of the bones, but which ceases as soon as the health is restored; and unless the curvature is relieved during the time they are thus preternaturally soft, they become hardened in the curved position, and are rarely remediable.

Muscular action is unquestionably one of the direct causes of curvature, both in this and in the former instance, as the bones are the fulcrum upon which the muscles act; and before as well as during the action of the muscles, the bones of necessity receive the weight or pressure occasioned by their contractions. In some instances of enormously fat children, the weight of the body appears to be the principle cause, as the upper extremities escape altogether, and the general health of the child does not suffer: and many cases are said by their parents never to have suffered.

The curvature in these cases is generally outwards of the tibia and fibula, commencing just above, or at the epiphyses of the lower extremity of the tibia, and will be found to exist more or less acute, frequently altering the position of the articular surfaces of the head of the tibia, which, carrying with it the condyles of the femur, produces what are termed bow-legs—the legs presenting, from immediately

above the ankle-joint, one uniform curve ; as I pointed out to you when speaking of the deformities of the knee-joint. It is rare to find the femur curved in these cases ; it is most common in true rachitis. You will find, also, a relaxed condition of the internal lateral ligaments of the ankle, and talipes valgus as a consequence, but more severe in the former instance. The muscles are generally well developed, notwithstanding the curvature, which, in the former instance, is rarely if ever to be met with. In fact, most cases of this kind present a healthy appearance, are of the natural size, and the bones of their proper relative proportions. These latter I regard as "non-congenital," and also, that they are not to be considered as indicative of general or constitutional debility, beyond the immediate condition, whereas the former are certainly subjected to general as well as temporary causes. A great deal has been written and said of the enlargement noticed at the extremity of the radius in these cases ; some supposing that an actual enlargement has taken place, others that it exists only in the imagination, and that it appears enlarged from the diminished muscular development. In true rachitis there is most certainly an enlarged or hypertrophied condition ; in false, I do not believe it exists either in the radius or in any other bone. In the skeleton of the fœtus you have had an opportunity of examining (vide fig. 40), this enlargement of the extremities of the long bones is most evident. The head has been said to be enlarged. The same remarks apply here also, for certainly, in the cases last mentioned, there is no trace of increased size. The pelvis, in true rachitis, does not become developed with the growth of the individual ; in false, always in common with the osseous system generally ; and I would refer you to a most interesting paper by the late Mr. John Shaw, in the seventeenth volume of the *Medico-Chirurgical Transactions*, in which tables are drawn up, showing the actual measurement in these cases ; so that there are many and most important differences between what I imagine to be two very different conditions, and which will guide you in forming your prognosis, as well as in the treatment,—which we come now to consider.

The treatment consists of general and mechanical means. In the severe forms commonly met with of true rachitis, of course your attention must be directed to the general health of the patient ; and every means must be used which will have a tendency to alter and improve their condition. The secretions are invariably unhealthy ; and the alterative I have found most beneficial has been the Hydrarg. c. Cretâ,

in small doses, given regularly every or every other night, not to act as an active aperient, but rather to gently relieve the bowels; and the tonic, the tincture of the sesqui-chloride of iron, in the form stated when speaking of knock-knees. If the bowels are in an irritable state, which is frequently the case in these patients, I have given them with advantage the extract of cinchona, combined with the aromatic confection, and the Hyd. c. Cretâ at night. However, it is immaterial what tonic is used, so long as the object is gained; and, of course, each individual would adopt that which he believes to be the most beneficial. The diet should consist of a nourishing, not stimulating kind. These patients do not bear stimulants, save only in the mildest forms: milk, eggs, meat, bread, and potatoes as a vegetable, I imagine to be most useful. Unfortunately the great proportion of cases occur amongst the poor, whose means do not, or whose modes of life will not admit of their procuring proper nourishment. Without this, however, it would be useless to treat them, as it is the sheet-anchor; change of air and diet is of the utmost importance. The sea-side is generally recommended. It is, however, of very little moment, although I prefer the country, where a child can run about without restraint, and without the necessity of being directed in its movements. There is nothing so conducive to health as the free exercise of the limbs of children subject to this disease, in the open air; and there is no place where this can be obtained so well as the country-cottage or farm-house. It certainly is of far more importance than all the physic that can be given, and in many instances saves both the life and health of the patient, as well as prevents or puts a stop to the increase of deformity.

As regards the mechanical treatment, your efforts must be directed so to apply your pressure and counter-pressure that the patient shall be in no way inconvenienced; that at the same time the curvature is being removed, such support shall be given them as will enable them to take exercise with greater facility and comfort than they could otherwise have done, as by so doing a greater assistance is given to the improvement of the general health. If, then, the curvature of the tibia is forwards, I would advise your using a straight splint behind the leg, well padded at each extremity, and having a hole cut at the point corresponding with the heel. Let the splint be secured with strapping, or common webbing straps and buckles, and let your pressure be regulated also by means of a webbing strap, first protecting the spine of the tibia with a pad having a hole cut in it to pre-

vent pressure being made directly upon it. The pressure can be thus increased by the smallest degrees, and with ordinary care will occasion no pain or inconvenience. In curvature of the tibia and knees outwardly, adopt the same means, applying the splint on the inside of the leg; and let the strap, with which the pressure is kept up, be applied over the point at which there is the greatest amount of curvature. In cases of curvature of the femur outwards, very little can be done, as there is no means I am acquainted with which will admit of constant and uninterrupted pressure being made. If, as is commonly the case in true rachitis, you have the femur curved outwardly, the tibia outwards, and inward inclination of both knees, I would advise your first removing the deformity of the knee-joints with the straight splint mentioned in the lecture on that subject, and afterwards applying splints on the inside of the tibia.

In all cases that present themselves in the incipient state, when the bones are still soft, by these means the deformity may be quickly and easily removed; but when the bones are becoming consolidated and hardened, the treatment of necessity becomes exceedingly slow, and will require a long and uninterrupted perseverance. The splints must be worn night and day, and removed only once or twice a week, for the purpose of cleanliness. Irons have been used from time immemorial; I object to them, because it is impossible to sustain so steady a pressure, or to increase it with the nicety that the common webbing strap enables us to do, without which there is no prospect of removing the deformity. In severe cases of anterior curvature, the section of the tendo-Achilles has been recommended. I do not myself see that any advantage is or can be gained by this proceeding, as in no instance can you proceed with rapidity; and before the curvature in the bone can be much relieved, the tendon becomes as strong as ever. It possesses one advantage, and that is, no harm results from such an operation. Some have advised, that before you attempt to straighten the limbs, you should improve the general health; by so doing, however, you must bear in mind, that the bones themselves are becoming hardened, and greater difficulty placed in the way of treatment. I find that the splints, when properly applied, are a direct comfort to the little patients; and the softer the bones are, the greater the facility of removing the curvature, and the less the time occupied in so doing; so that in all cases let this be one of your first considerations. In cases coming under

the term "false rachitis," you will rarely find it necessary to interfere with the general health; but, of course, should it be necessary, you will adopt such means as may appear expedient.

We have had but one case of "fragilitas ossium" in the Charity, and this in a female aged 17, who possessed that pallid, strumous, unhealthy aspect, so common in these cases. From her own and mother's account, she had suffered from fracture of the arms, legs, and thighs, about forty times. Walking across the room, the thigh-bone of one or other extremity would suddenly snap, when, in falling, her arm would be extended to protect herself, and the humerus become fractured. There certainly was evidence, from the curvature existing, of very numerous fractures having occurred. She applied at the Charity, for the relief of severe anterior curvature of the left tibia, which was bent almost to an acute angle at its lower third, the limb being about four inches shorter than its fellow. The tendo-Achilles was divided by my late colleague, and extension kept up with decided benefit, as the leg was lengthened full two inches. Supports from the hip downwards were afterwards ordered, with which she was enabled to walk; and since she left the Charity no return of the fracture has taken place. This condition of bone, as well as the mollities ossium of old people, is totally different from that we have been considering, although some authors have designated the latter by the term of *rachitis of old people*.

LECTURE XI.

ANGULAR CURVATURE OF THE SPINE. POTT'S DISEASE: NATURE OF — TREATMENT. TREATMENT OF ANGULAR CURVATURE OF THE SPINE.

I MUST now draw your attention to angular curvature of the spine, of which an immense number of cases present themselves at this Charity. This deformity arises from disease and ulceration of the bodies of the vertebræ, for the true knowledge of which we are indebted to the late Mr. Pott; and as the deformity is, generally speaking, the first thing that attracts the attention of the parents or friends of the patient, and also that which induces them to apply for relief, a large proportion of cases attending here are suffering

from active disease, as well as the curvature consequent upon it : it becomes therefore necessary that I should briefly allude to it. This affection, then, consists of ulceration of the body or bodies of one or more vertebræ, and is found to attack any portion of the spine from the atlas to the sacrum ; most frequently the dorsal vertebræ ; secondly, the lumbar ; and lastly, the cervical. It generally occurs in weak and unhealthy children, who are already predisposed, from any slight casualty, to diseased action. Not unfrequently it is combined with the tubercular diathesis, which will be found occasionally in the active stage ; and in all instances that peculiar condition called “strumous” is but too evident. The strumous and tubercular, however, to my mind, differ but little from each other.

The first circumstance, then, that attracts attention, and for which you will be consulted, is a projection in one or other of the situations mentioned, sometimes so slight as scarcely to attract attention, and without any external evidence of disease beyond the simple projection. This projection, however, when the result of disease and loss of substance of the bodies of the vertebræ, is *always* angular ; from which fact it may be at all times recognised, even in this its most incipient state, and by which it may be distinguished from the posterior curvature of the spine common in children, but which exists without any disease affecting the vertebræ. It is of great importance that you should distinguish the one from the other, especially in the incipient stage, as by so doing a stop may be put to the progress of the ulceration, and of course deformity, as well as the serious consequences attending its progress altogether prevented. As the ulceration proceeds, the angle increases, and becomes more or less acute, according to the number of the vertebræ affected, and the loss of substance sustained. The spine being no longer capable of bearing the superincumbent weight of the head and shoulders, an additional source of irritation is thus mechanically brought into operation, which not only increases the amount of the deformity, but also that of the disease itself, — an important fact to be borne in mind in the treatment, as I shall presently point out to you. In the commencement of this affection the patient suffers very little pain — at all times some — which is characterised by an occasional scream and general restlessness, not sufficiently defined to attract attention to the spot. As it proceeds, however, the pain becomes more severe, and is increased upon motion of any kind ; and as it is scarcely possible for the spine to be kept at rest by the

efforts of the patient or friend simply, in many instances the general health suffers from the constant irritation thus kept up, the appetite fails, the bowels are irregular, the secretions unhealthy, and, unless relief is obtained, hectic supervenes, abscesses form, and death puts a period to their existence. As the ulceration affects the anterior surfaces of the bodies of the vertebræ, of course it is in this situation that the matter is formed in cases of abscess, the existence of which is generally indicated by an enlargement and thickening on each side of the projection, as well as above and below it, and also by the increased disturbance in the general health. As the matter increases in quantity, it descends, principally by gravitation, behind the fascia into the pelvic cavity, and not unfrequently presents itself on the anterior and internal surface of the thigh, below the insertion of the psoas and iliacus muscles, having been confined in its course by the fascia covering them. At other times it does not proceed so far down, but will present itself in the loins; several cases of which have lately occurred. The matter thus secreted amounts oftentimes to an incredibly large amount, and, after the active symptoms occasioned by its first onset have subsided, produces very little irritation. A patient was admitted some time since with angular curvature affecting the dorsal vertebræ, in a girl aged about five years, whose general health was at that time very good. She remained in the house about three or four months, and was during that time kept in the horizontal position, with a support to the back, which prevented any motion taking place in the spinal column. The child continued in good health and spirits, and the projection was certainly less acute. I ordered that she should be placed on an inclined plane during the day, with a view of diminishing the angle so far as the compressed intervertebral substance would admit of, immediately above and below the angle. This was accordingly done. On the third day the nurse drew my attention to a general arrangement of the left thigh. I examined it, and believed that I could distinguish a sense of fluctuation. There was no pain occasioned by the examination, neither had the child complained previously. On the fourth day the thigh was inflamed throughout its entire extent, and the cellular tissue became somewhat indurated. Several gentlemen saw the patient, some agreeing with me in opinion that there was matter, others differing, regarding it as inflammation of cellular tissue alone. I then ordered fomentations, poultices and bandages, and in a week the redness subsided, but not the

swelling of the thigh. In about a month afterwards a projection was noticed in the situation of the left loin, which continued to increase, and at once proved that the cause of the swelling was the existence of a lumbar abscess, and which had been forming for some time previous to her admission; for from the time of her entering the hospital up to this period, her health had been uninterruptedly good. The collection of matter had, however, slowly increased, and was first indicated by the change from the horizontal to the inclined position, the matter gravitating down, and appearing in the thigh. After the horizontal position was resumed, the swelling in the thigh diminished, and the abscess pointed in the lumbar region.

Another case similar to the above occurred a short time since. A child, about four years old, had been attending as an out-patient for some months, and appeared to improve in health and strength. She was wearing a support, which I shall presently show to you, and got about without any apparent inconvenience. However, on one occasion, her mother stated that the instrument had made her back swell. Upon examination I found a projection in the loin, indicating the existence of a lumbar abscess; so that it appears that after the symptoms have subsided, the collections of matter still goes on, the evidence of which we are totally at a loss to discover, until it presents itself in one or other of the situations mentioned; and, as in the cases just now related, apparent improvement may continue for months with this serious addition to the original disease. You cannot, therefore, be too cautious in expressing an opinion upon these cases.

In some instances paralysis of both lower extremities will be found to coexist: this circumstance is not occasioned by the curvature of the spine, for in the most severe curvature that can be met with the functions of the spinal marrow are not interrupted, or in any way impaired, but by pressure occasioned either by inflammation of the chord, and effusion as a consequence, or by the pressure occasioned by a collection of matter, with the entire obliteration of one of the bodies of the vertebræ.

If the integrity of the canal is preserved, which it generally is, and the inflammation is not propagated to its investing membrane, no matter how acute the curvature or angle at which the spine may be, the spinal marrow adapts itself to the change of position without any interruption to its normal functions;—instances of which may be found in every museum. What is the cause that first set this disease

in operation? Some have assigned a specific cause, as disease of one or more of the bodies of the vertebræ: I am at a loss to imagine this, as there is nothing that I can discover specific about it; there is simply inflammation and ulceration of the bones, similar to that which is witnessed in the neighbourhood of the hip and knee-joint most commonly, at times also in the elbow and wrist-joint. In these instances a blow or fall, or some injury, has preceded the diseased action, and to which the friends assign it. In this particular instance invariably the cause assigned is a fall or other injury, and I certainly am of opinion that it is brought into operation by some mechanical injury; although we must admit that these patients are predisposed to diseased action either constitutionally, or from general and excessive debility. There is rarely any activity evinced in the most severe cases from the commencement to the termination of the disease, which arises from a general want of power, and the consequent inability that exists for the restorative efforts either to put a stop to or to control the diseased action, until an improvement has taken place in the general health, which improvement it is at times difficult to bring about; and it must be borne in mind that a slight and almost imperceptible injury is sufficient to set up diseased action, in whatever part it may happen to be applied. There does not appear, therefore, to be the capability of resisting diseased action, provided that the part or parts are subjected to the slightest interruption in the performance of their functions. These patients, however, present oftentimes the appearance of health, and upon inquiry their relatives will inform you not only that they were in good health, but that they had not suffered previously. This is no proof against the supposition that there is a predisposition to disease, inasmuch as a state of apparent health is unfortunately consistent with the existence of mortal diseases—as is witnessed in the incipient stage of cancer, and other malignant affections.

Treatment.—From what I have said, you will perceive that the treatment of this disease resolves itself into general, local, and mechanical. As the constitution or general health is in all cases at fault, every means must be had recourse to which has for its object the improvement of the health of the patient, and it must be evident that tonics, attention to the diet, as well as to the secretions generally, will require the greatest perseverance, and also that absolute rest is indispensable.

The first thing to which you must direct your attention is that of preventing any motion taking place in the spinal

column beyond that which is almost unavoidable ; and the most effectual means of accomplishing this object is to place the child either on its back or face, in the horizontal or inclined position, or both—the plan adopted by the late Dr. Verrall (the inclined position on the face). On no consideration ought the patients to be allowed to place themselves in such a position that the weight of the upper portion of the body shall press, and therefore irritate, the existing disease : during the active stage, as well as during the first efforts of restoration, this point must be made a *sine qua non*, for without it all other means are of necessity abortive : no one would for a moment allow any mechanical irritant to press upon an external wound, neither is any one to be found who would justify such a proceeding, or scarcely believe it if they saw it ; and yet, this disease, which is placed in a similar circumstance, from its seat and nature, is but too often subjected to the constant irritation from want of proper attention to this point, and also might be added, to the serious mischief and consequences which so often result as a sequel to this affection.

The plan I usually adopt is the following : to request that the parents should obtain a board somewhat wider and longer than the patient ; let a horse-hair mattress be placed upon it, and let two circular holes be made in it at the point corresponding with the axilla, in which can be inserted a couple of plugs (one for each side), when the patient is in the inclined position, to prevent them from slipping down. With this simple contrivance, which is within the reach of all, from the facility of obtaining it, a child may be kept at rest, the disease protected from pressure, and the angle relieved, or, at all events, any increase of it effectually prevented ; whilst at the same time it is the greatest possible source of comfort to the patient, who instead of becoming fretful and irritable, with the health suffering as a consequence, as might be anticipated from the confinement, actually improve in health, and are most completely relieved from pain.

The restorative process in disease of the bones, is, as I had occasion to remark when speaking of disease of the knee-joint, always slow from its very nature ; therefore the treatment must be continued for some months ; otherwise, whatever improvement may have taken place, the parts become easily irritated from the pressure occasioned by the erect posture, a relapse with increased mischief follows.

Counter-irritation was used with success by the late Mr. Pott, and its advantages have since been proved by the test

of experience. I have found *mild* counter-irritation answer every purpose, without the risk of interfering with the child's health, or of adding to the irritation from which it already suffers; and the form I usually adopt is that of an ointment compounded of equal parts of the *Emplastrum Lyttæ* and *Unguentum Hydrargyri*, directing the attendant to rub the part on each side of the projection, and above and below it, then to apply a soft linseed-meal poultice; this is generally followed by an eruption and redness without destroying the cuticle. I then direct that they should allow this irritation to subside before a fresh application is made, continuing, however, the use of the poultice, which very frequently keeps up sufficient irritation of itself. As soon as the irritation on the surface has subsided, or nearly so, let the ointment be re-applied, and a similar course pursued as long as there is any evidence of active disease existing.

As this disease is essentially one of debility, or connected with it, the diet must be nourishing and slightly stimulant. Some object to stimulants; I have found them decidedly useful at times in giving tone to the stomach; especially where the appetite is bad, and when there is great depression, small quantities of Port wine, or beer, are of great assistance. As it regards the tonic, that must be left to the discretion and experience of each individual; I prefer, as I have often stated to you, the preparations of iron. The bowels must of course be regulated, and if it becomes necessary to use aperients, let them be of the mildest form, merely to produce the effect without irritating or exhausting the patient; castor oil is as good a means as any, and one which I recommend to be given when necessary. Occasionally, when there is great constitutional irritation during the formation of matter, you will do well to allay it by an opiate at night, which can be given in conjunction with the *Hydrargyri c. Cretâ*; and, should the bowels be relaxed, the *Mistura Cretâ*, with the Aromatic Confection, and a small quantity of *Tinct. of Opium*, should be administered regularly, until it is stopped; if, however, the general health is good, the appetite natural, I should not advise any interference, merely strict attention to the position. When paralysis of the lower extremities has come on, I have found it necessary to increase the local irritation, and to administer mercury in the form of the *Hyd. c. Cretâ*, regularly, and in some instances with success. Even in these cases a nourishing diet must still be continued, and the strength of the patient supported in every possible way. A patient is at this time attending, whose lower extremities were completely paralysed — not

a trace of motion could be discovered ; by these means he is gradually recovering the lost power, which first returned in the muscles of the toes, then the feet and knees. The amount of power is still slight, but it is evidently increasing. I believe I have noticed the principal points in connexion with this affection, and I shall now return to the deformity resulting from it, and existing after the subsidence of the diseased action, namely,

Angular curvature. — From the cause of this deformity, it must be evident that our efforts can only be directed to relieve, not to remove, this deformity, inasmuch as when once a loss of substance has taken place in the bodies of the vertebræ, it is not reproduced, at least in a very imperfect degree ; therefore, to straighten the spine, which undoubtedly, in young subjects, could be done, would be to adopt a mode of practice unscientific, and fit only to be pursued by charlatans and quacks, who have neither character or reputation at stake. If the deformity is very slight, and you have an opportunity of treating it immediately following, or very shortly after the subsidence of the disease, you can effectually put a stop to any increase which must otherwise occur from the gradual compression of the intervertebral substance above and below the angle ; by doing which it becomes of little moment, and, when cured, of no inconvenience, to the patient. If, on the contrary, the deformity is to any extent, and the patient young, the relief that can be *prudently* obtained is that which is occasioned by the compressed intervertebral substance ; this, at times, is of some amount, and upon its being removed, reduces considerably the appearance of the deformity. The mechanical means I have adopted are similar to those which have been in use from time immemorial, namely, a support to the upper extremities, consisting of a band which encircles the pelvis, having attached two crutches, one on each side, to support the shoulders, the crutches consisting of a male and female screw ; which enables me to increase their length, provided relief is obtained, as the child grows — *Vide* fig. 42. I then direct that a broad flannel band should be passed round the crutch on one or other side, and over the projecting vertebra, then round the opposite crutch back again to the commencement of the band, and there united : by this means an effectual support is given without encircling the abdomen. Of course this applies to curvature existing in the dorsal or lumbar vertebræ, and not to that which exists in the cervical vertebræ. In the latter instance I have used a support similar to that represented

in fig. 43, having, in addition, a part to support the head alone, so that the pressure on the anterior surface of the vertebra is effectually prevented, as in this instrument [showing it]. The use of the support must be uninterruptedly continued for years, and for the first year at least it should be worn night and day, otherwise the deformity will increase, not so much from the original seat of the affection, but from compression kept up in the intervertebral substance. In older cases, where the deformity is severe, and the loss of substance considerable, no benefit can be expected from any treatment beyond that which is connected with the feelings of the patient. Where there is a great

Fig. 42.

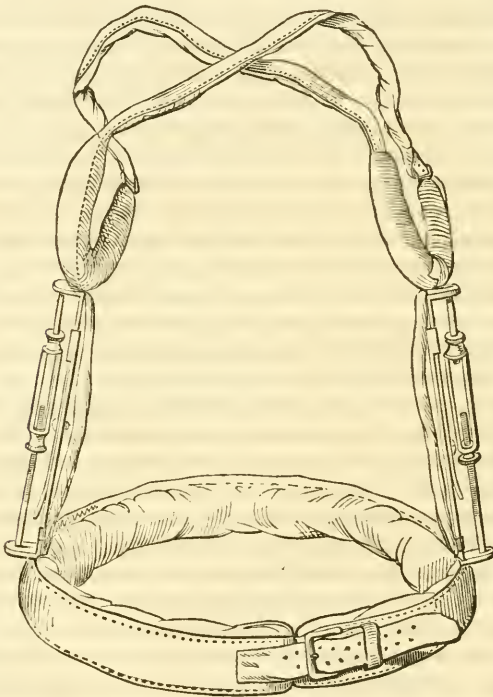


Diagram of an Instrument for the relief of angular curvature, the description of which is given in page 171.

weakness, and inability to take much exercise without fatigue, a support similar to that represented is frequently of the greatest comfort and assistance ; but recollect that it must be used only as a support, and not with a view of ex-

tending the spine forcibly. In fact, in all cases of this kind, this principle must be adopted, as force or violence of any kind can lead only to results which would be regretted. A case of a young man occurred, some time since, in the hands of the spinal empirics — alike ignorant of the cause as well as of the effect, at least it is charitable to think so — in whom violent force was had recourse to, with the removal of the deformity, certainly, but at the cost of the sudden death of the patient as a consequence. Violence or brutal force, such as was used towards this unfortunate patient, cannot be too strongly deprecated.

LECTURE XII.

POSTERIOR CURVATURE OF THE SPINE.

By posterior curvature is understood that condition in which the spine becomes curved from before to behind, without any lateral deviation ; and it will be found to present itself either in one uniform curve from the lower cervical to the last lumbar vertebra, or, as is more commonly the case, confined to the upper dorsal and lower cervical vertebræ ; the patient presenting that appearance better known by the term of “ stoop.”

You will, as a rule, find the condition first mentioned, in which the whole spine is affected, confined to young children, and infants under twelve months of age, whose general health is bad, and who suffer either from constitutional or temporary debility, whereby the muscles of the spine are incapable of maintaining it in the erect position ; the consequence is, that the weight of the head and upper extremities becomes thrown on the vertebræ and ligaments, and secondarily on the intervertebral substance, which, by its yielding, allows of an undue approximation of the bodies of the vertebræ at their anterior surfaces, and for the time, compression of the intervertebral substance itself.

I have never witnessed this condition “ permanent.” The cases that have presented themselves have been infants and young children, in whom the pallid aspect, anxious countenance, and flabby condition of the muscles and cellular tissue, indicative of a general want of tone, has been most evident ; occasionally, also, general emaciation, and

the enlarged tumid abdomen symptomatic of mesenteric affection, present themselves.

The little patients, then, when placed in the sitting or erect postures, are noticed to bend forwards, and are found to be incapable of supporting themselves in the erect position, for which you will be consulted; and, upon examination, the spinous processes of the vertebræ may be traced, throughout their entire extent, forming an uninterrupted curve, and which, in thin children, will be obvious to the eye. It is necessary that care should be exercised, for it might be mistaken for the incipient stage of Pott's disease of the vertebræ, although, as I had occasion to mention when speaking of angular curvature, in that affection, even in its origin, a distinct projection of one vertebra may on all occasions be discovered; whereas in this now under consideration, the sign will be found wanting; added to which, by placing the patient in a horizontal position, on the face, the deformity altogether disappears. In angular curvature, the projecting spinous process of the affected vertebra will still be found more or less prominent. It is so evidently necessary that great caution should be used in forming a diagnosis, that it cannot be too strongly impressed on your attention. Delpech mentions a case of this kind occurring in an adult, brought into operation by an attack of rheumatism, but I have never met with it except at the early age mentioned.

The second condition spoken of, namely, that in which the curve is confined to the lower cervical and upper dorsal vertebræ, will be found at any period, from ten years of age until puberty, and, as in the first mentioned instance, is brought into operation by general debility, from whatever cause it may arise. It is common to both sexes and is often combined with the strumous diathesis, — very frequently met with in young persons who grow rapidly, and who suffer from the weakness attendant upon a rapid growth. Any occupation which requires much stooping, as a compositor or engraver, also brings it into operation. In fact, any cause by which the muscles become over fatigued, and the weight of the upper portion of the body is thrown more than is natural on the passive attachments of the vertebræ, will produce this deformity.

At the commencement the patient will be noticed to stoop only when in the sitting posture, and little attention is paid to it, as by reminding them, they can with an effort sustain themselves in the erect position. By degrees, however, the stooping becomes permanent, and the inability to

overcome it entirely, attracts attention. The intervertebral substances is the first to suffer from the undue compression that it is subjected to. The ribs are of necessity prominent posteriorly, and project more than is natural, and the scapulæ become thus raised, and appear upon examination as if separated from the thorax, which, in fact, is actually the case at all portions excepting the centre of those bones; and, upon examination, the finger may with little difficulty be passed almost completely under the bone. Occasionally I have noticed a sensation of crepitus, as if the ribs grated upon the venter of the scapula; and so distinct is the sensation, that you will with difficulty reconcile the possibility of the absence of fracture, and I am totally unable to account for it. The patient then suffers from a confirmed stoop, which will not disappear in the horizontal posture. The head and neck appear to sink in between the shoulders, and they present that peculiar appearance common to old age. Their health becomes evidently impaired from the passive irritation that they are subjected to by the sensation of weakness, which does not subside in all instances even after puberty, and when the deformity has become irremediable, as, of course, the motions of the ribs, are more or less limited. We have had lately two patients in the Charity, the one a female aged 20, the other a male, 24 years of age. In both the sense of weakness induced them to apply for relief, and also to submit to treatment, although I informed them that little if any good could be done. I mentioned this to you, in order that you may be induced to pay attention to such cases when they present themselves, as, from the simple and obvious nature of the deformity, it is liable to be passed over as one that does not require attention, or as one which might remedy itself as the patient grows; which may in some instances undoubtedly be the case; yet the fact of its being so does not warrant the omission of such treatment as will certainly prevent a confirmed stoop, and the adoption of which would tend to improve the general health, as well as avoid all risk.

Treatment.—In the cases first mentioned, occurring in infants, the treatment must be directed to improve the general health. The administration of the usual tonics, combined with attention to the bowels, and a nourishing diet, with or without stimuli, according to circumstances, must be had recourse to. In infants at the breast, if the health of the mother is delicate, I have found small quantities of beef-tea, — that is, a simple infusion of beef, or

calves' foot jelly warmed, and given once or twice daily, — of the greatest advantage. In children, meat, eggs, milk, and potato as a vegetable, ought to form the principal food. In both cases the horizontal position ought to be had recourse to, either uninterruptedly, or as soon as the patient is observed to stoop. In this way the deformity may be altogether prevented.

In cases which occur at or after the age of ten, and in which the deformity is confined to the upper dorsal and

Fig. 43.



lower cervical vertebræ, the treatment must be directed according to the age of the patient and the condition of the curve. If the deformity is slight, and of short duration, the patient young, and the curve can be considerably or

nearly removed when the patient is placed in the horizontal position, I would advise the use of a simple board, similar to the back-board commonly in use at schools, three or four times daily, as long as the feelings of the patient will admit of, together with attention to the general health, combining change of scene and air, if possible, as by these simple means it may be quickly and effectually removed. Several cases are now attending at the Charity, which have readily yielded to this treatment. Should there be any occupation pursued by the patient which has been the immediate cause, of course attention must be directed to it, or a relapse will naturally follow. If, on the other hand, the deformity, has become confirmed, and, upon examination, the vertebræ are found to be rigidly fixed in the curved position, the treatment must then be uninterrupted, for which purpose I have used with advantage the instrument represented (*vide* fig. 42); with which, at the same time that the weight is taken off the upper portions of the spinal column, a continued pressure can be kept up upon the prominent portion of the curve by the back-board attached, and the shoulders held back by the straps. This instrument, however, must be worn night and day, as, unless the extension is constantly maintained, little if any good can by possibility be effected. In some cases of long standing great good has been derived, and in all the relief obtained by the feelings of the patient has been most complete. The head-piece attached can be removed at will, so that the patient can remove it if it is desirable for appearance, and re-apply it at other times. This deformity is sometimes combined with lateral curvature, which I must now beg to draw your attention to.

LATERAL CURVATURE.

By lateral curvature, then, is understood that condition in which the spine deviates from the perpendicular position to either side, occasioning an alteration in the relative position of the ribs, scapulæ, and muscles attached.

This deformity arises, as I have had occasion to point out to you in the preceding lectures, from any cause by which the motions of the lower extremities are rendered irregular in their actions, or by which their uniformity of action is destroyed.

2dly. From general debility or loss of tone simply, or general debility combined with or consequent upon a rachitic condition of the bones generally, with its attendant unhealthy state of constitution.

3dly. Any occupation by which the muscles of one side or extremity are more frequently exercised than those of its fellow, such as nursing, is a frequent cause in the lower classes of life.

I believe that this deformity exists entirely independent of any *disease* of the bones, ligaments, or muscles, — at least as a general rule, the rachitic condition alone excepted. The immediate cause in either case is purely mechanical, namely, the superincumbent weight of the head and upper extremities, combined with the constant effort instinctively made to keep the head in a perpendicular position with the sacrum, with the inability of the muscles and ligaments accomplishing this object in the normal position of the vertebræ.

If the motions of one or other of the lower extremities are impeded by any of the deformities hitherto mentioned, an irregular and unsteady manner of walking is the consequence ; and as the effort is constantly in action to maintain the head in the perpendicular position, an increased and undue lateral motion is kept up in the spinal column, by which the ligaments become gradually and abnormally elongated ; and unless the general health of the patient is good, and the muscles of the spine well developed, a deviation of the spine laterally is the result, which in time becomes permanent.

I have at this time a patient, aged about seven years, who has suffered from a loss of power in the left lower extremity, without, however, any contraction or paralysis of any muscle, simply diminished power of the muscles in that extremity, which occasioned a limp, and inability for him to walk steadily, or without the appearance of lameness, in whom, from the constant strain upon the ligaments of the spine, an incipient lateral curvature has presented itself, which, if neglected, would undoubtedly terminate in a severe distortion of the spine, and add to the lameness already in existence. Many cases may be seen amongst the out-patients of the hospital, which will illustrate this most satisfactorily ; so that too much attention cannot be paid to this cause, especially in young patients.

General debility, or a simple loss of tone, is perhaps the most frequent cause, especially in the higher classes of life, who are by far the most numerous sufferers from this distortion, from their position in society placing them beyond the necessity for exertion ; and it is a melancholy fact, that the education, the habits enjoined by custom, the occupations of the higher classes of female society, are totally at variance

with, and in opposition to, the due performance of the various functions of the body, the exercise of which is absolutely necessary for the preservation of the health of the individual. To this, and this alone, can be ascribed the prevalence of this deformity in the higher classes of life.

What is the condition of a young female thus circumstanced? For the first few years of their existence they are allowed to exercise their body unrestrained, in common with other children, but at a very early age they are subjected to the confinement of a school, or private studies, and, before they are capable of thinking, are taught, as it were mechanically, to observe a certain degree of restraint in all their actions: the very use of their limbs is not allowed, except it be to take a carriage-riding, or half an hour's walking exercise; at other times shut up in a study or nursery, and due care taken that not a breath of air shall blow upon them. What is the consequence of these absurdities? The general health first suffers, and the child becomes the constant object of the medical attendant. The muscles, whose proper and full development can only take place by exercise, become atrophied and flabby, the digestive organs become deranged, the bowels irregular in their action, and I believe oftentimes the seeds of disease are sown in some vital organ, which puts a limited period to their existence. The only objects which seem to be worthy of attention are what are called the accomplishments of life, so that these unfortunate creatures would be better without a body, than with one, for the use that is made of it. This, then, is a common cause of lateral curvature of the spine: the muscles are incapacitated from performing their proper functions; an unnatural stress is thrown upon the ligaments of the spine, which they also are incapable of bearing; a gradual elongation takes place, and, as a consequence, a deviation of the spine from its perpendicular position; and when once this occurs, an increase rapidly follows, if unattended to, as the stress on the ligaments becomes constant, and of course increased elongation, and consequent deformity, quickly result. General debility, arising from any casualty, or from any of the febrile diseases common to early life, such as scarlet fever, &c. &c., will of course produce this deformity under any circumstances, or in any position of life.

The next cause mentioned is that of nursing, or any occupation by which the muscles of one side or extremity are more frequently exercised than those of the opposite extremity. Many cases present themselves at this Charity, of young females who are compelled to carry a child about

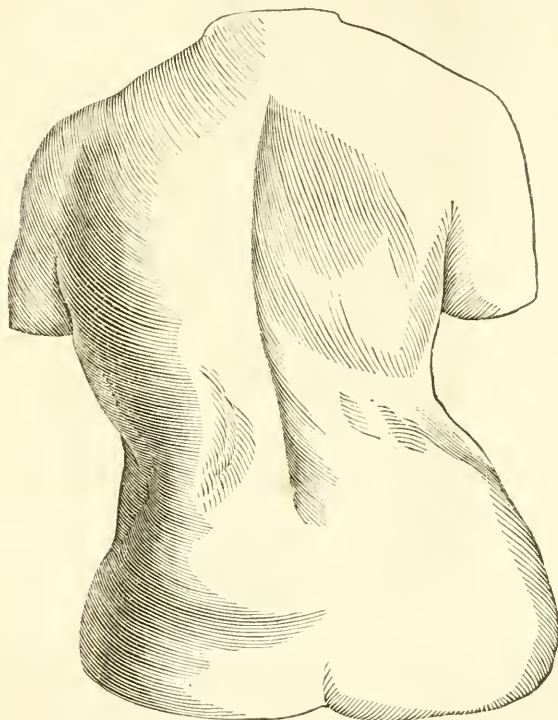
the greater part of the day, when, however good the general health may be, the muscles, attached to the side on which they carry the child become more fully developed, and consequently the balance of power between the two sets of muscles becomes destroyed, when, as in all cases of deformity, the stronger overcome their weaker antagonist, and a lateral deviation is the result.

As it regards the rachitic combination or cause, this of all others is the most serious, inasmuch as the osseous system generally is not in a condition to perform the office for which it is destined, namely, as a support and fulcrum upon which the muscles act, without yielding in one or other direction, when an actual alteration in the relative size and proportions takes place; so that in all cases of this kind there is a serious addition to the malposition of the vertebræ, as well as a more severe distortion of the spine and chest, than in either of those previously mentioned; and very frequently the tubercular diathesis coexists.

Lateral curvature, then, when unaccompanied with rachitis, commences generally about the age of 11 or 12; and the first thing which attracts attention is the projection of the shoulder (generally the right), with the supposed enlargement of the hip on the opposite side; and when examined in its incipient state, a much greater amount of lateral motion in the spinal column will be found to exist than is natural. The spine will be found to be curved only when the patient is in the erect position, and when in the horizontal posture very slight force will straighten it, and even carry it somewhat to the opposite side. If no means are taken to stop its progress, the stress on the ligaments becomes constant, and a rapid increase of the deformity follows: and as the erect position cannot be maintained with one portion of the spine *alone* curved, a second curve takes place in the lumbar vertebræ. As it proceeds, the ribs, from their direct attachment to the spine, are also displaced, project on the convexity of the curve, and fall in on the concavity: hence the projection of one shoulder, and the falling in or flattened condition of the other (vide fig. 44). The sides also alter in shape according to the nature of the deformity, being hollow on the concavity, round and projecting on the convexity. The ribs become compressed, and approximated to the ilium on one side, raised and separated on the other; so that one of the first things for which you will be consulted is a supposed enlargement of the hip. The shoulders become unequal, the one apparently raised, the other depressed, and approximated

to the ilium of the corresponding side. The chest also becomes altered in its anterior aspect, being flattened on the side corresponding with the convexity, projecting on the side corresponding with the concavity. The bodies of the vertebræ themselves become separated more or less on the convexity of the curve, compressed in the concavity ; and the intervertebral substance, from the undue pressure it is subjected to in the concavity, becomes condensed, and

Fig. 44



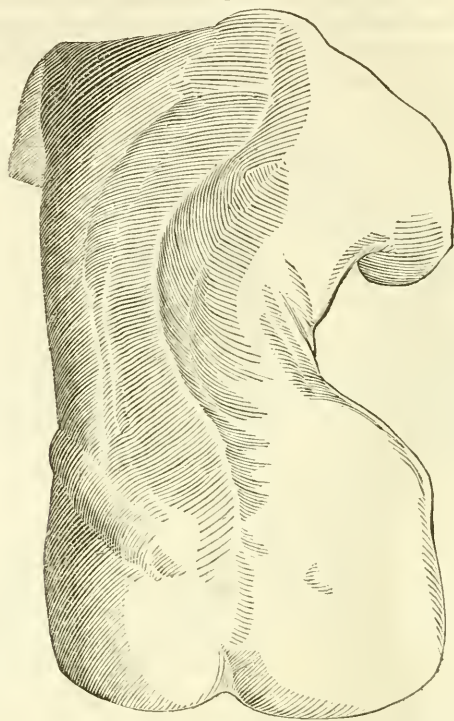
An illustration of incipient lateral curvature.

in some cases more or less absorbed ; whilst the ligaments of the spine are elongated on the convexity, and, in permanent curvatures, become contracted, and offer a great resistance in the concavity. The muscles are more prominent on the convexity, from the diminished space occasioned by the projection of the ribs and transverse processes ; less so on the concavity, from the increased room derived from the flattened condition of the ribs, and the diminished length and increased breadth which naturally result.

These, then, are the general results from ordinary curva-

ture in the form of the *Italic S*. Occasionally a treble curvature will be met with; one high up, affecting the lower cervical and upper dorsal vertebræ: a second abruptly following it, in which the middle and lower dorsal are

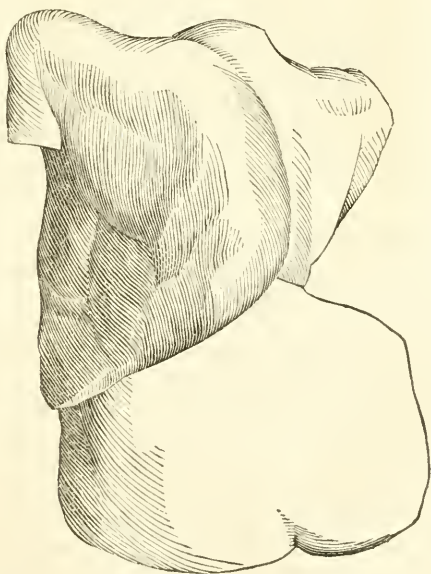
Fig. 45.



curved in the opposite direction; and a third in the lumbar vertebræ, in the opposite direction to that last mentioned (vide fig. 45). In ordinary cases of this description the bones themselves of the spine, or of those of the pelvis, do not suffer; it is a simple malposition, which effects the passive attachments more or less, together with the position of the muscles. In the more severe cases, and especially those connected with rachitis, there is not merely a lateral deviation, but an actual twisting of the spine, a semi-rotated condition of the vertebræ; and in the rachitic curvatures which commence at the age of three or four years, and sometimes earlier, an actual compression of the bodies of the vertebræ in the cavities of the curves. The ribs also

become flattened, and present posteriorly not merely a round projection, but an acute angle. The scapula on the projecting side becomes raised, and its posterior edge looks directly backwards, the glenoid cavity directly forwards, the spine outwards, and the venter inwards; in fact, it becomes twisted half round, as it were, and gives the patient more the appearance of having a large tumour growing at the back of the neck, and approaching the ear, as if the head had sunk between the shoulders (vide fig. 46); in fact so great is the amount of distortion occasionally met with, and the consequent alteration in the relative size of the cavity of the chest or abdomen, that it is a matter of surprise an individual can exist, and possess as some unquestionably do, a tolerable state of health. The general symptoms are those common to a weakened state of constitution. There is generally an inability to bear even slight bodily exercise without suffering from fatigue; a constant sense of lassitude and weakness: pain in the side or sides, and back, occasioned in all probability by

Fig. 46



the stretching of the ligaments, and by the interruption to the functions of respiration, as well as from the derangement of the general health of the patient. The catamenia

are frequently irregular, and attended with much suffering; in fact, the deformity itself must of necessity, from the mechanical impediment to the exercise of the muscles of the back and of respiration, as well as the limited amount of bodily exercise which almost necessarily results, present an effectual barrier to the possession of good health.

The use of stays, as well as various other supposed causes, has been assigned by different writers on this subject. I do not myself believe that they exert so great an influence as is supposed, certainly not in producing this deformity. Stays are worn in all classes, whereas the deformity is very rarely met with in the lower class of life. Many other causes have been assigned, which I believe to be merely effects, and although they may increase the deformity when once in existence, yet I cannot regard them as causes.

LECTURE XIII.

LATERAL CURVATURE OF THE SPINE, CONTINUED. GENERALLY RELAXED CONDITION OF THE LIGAMENTS OF THE SPINE, WITHOUT PERMANENT DEFORMITY, EXISTING AFTER PUBERTY. TREATMENT OF LATERAL CURVATURE. CASES WHICH MAY BE CONSIDERED CURABLE, OR CAPABLE OF BEING RELIEVED — CURABLE OR ADMITTING ONLY OF SUPPORT.

THERE is another condition I have occasionally met with, of lateral curvature of the spine, in patients past the age of puberty, which I omitted to mention to you, differing from that which I endeavoured to point out to you in the last lecture, inasmuch as the curve (in the form of *Italic S*), is witnessed only during the time the patient is in the sitting or erect posture, and in which there exists a generally relaxed and weakened condition of the ligaments on either side of the spine, but without any permanent deformity; for instance, when the patient is in the sitting or erect position, the curvature is most evident, but place them in the horizontal, and it is altogether absent; and you will find that very slight pressure will, during the time they are in the erect posture, altogether remove the curves; and if the pressure is increased, the spine can be readily curved beyond the perpendicular in the opposite direction: *i. e.* a lateral curvature of the opposite side is easily made.

In the cases which have fallen under my observation, I have found upon inquiry that from the first appearance of the deformity, they have at the suggestion of their medical advisers confined themselves during the greater part of the day in the horizontal posture, and continued this plan of treatment for years; to which I imagine, it owes its origin, as, by so doing, the mechanical cause, namely, the superincumbent weight of the head and shoulders, is rendered inoperative, whilst the passive condition of the spine, as well as of the muscles generally, tends to keep up the first cause, namely, debility, and effectually prevents their recovering their lost tone, whereby they are rendered incapable of supporting the column in the erect position even for a short time. The ligaments, also, suffering from the general cause, yield abnormally on either side when subjected to the stretching or pressure occasioned by the weight of the upper portion of the body, and the inability of the muscles to fulfil their proper functions.

The general health is, as a matter of course, exceedingly weak and delicate, in which all the tissues participate; for although the means adopted unquestionably prevent an increase of deformity, and its becoming permanent, yet they at the same time prevent those means being used by which *alone* the general health can be restored, namely, change of air, and exercise. And it is certain that all the tonics combined, must under such circumstances, be of no avail, beyond the temporary relief afforded. We now come to the

TREATMENT OF LATERAL CURVATURE.

The treatment of this deformity of the spine has formed the subject of so many publications, each differing more or less from the other, and the opinions entertained by the profession (I mean the legitimate portion of it), have been of so opposite a nature upon the subject, that it is not a matter of surprise, that the unfortunate patients should have been left almost exclusively in the hands of empirics, or, at the mercy of unprincipled quackery; hence the various "couches," "reclining boards," the multitude of supports, not to mention the means formerly used for reducing a supposed dislocation of the vertebræ, "professed rubbers," by way of varying the scene, &c. &c. &c.; added to which, the time occupied in treating a case has been of so long duration, that few in the profession have had the courage to undertake the treatment of these distortions, which has been so "hedged in" with apparent, and, I may say, created

difficulties, and has been so unsatisfactory in its results. If, however, the general cause be that which I believe it to be, namely, debility, unattended with disease, the indication of treatment is simple and straightforward. In all other deformities, after removing the greatest obstacle, namely, that of the most powerfully contracted muscles, by well-regulated pressure and counter-pressure, the passive attachments yield, and if there is no malformation, the natural form is restored; and in paralytic cases, where there has been an unusual relaxation of the ligaments of a joint, experience teaches us that with the use of a continued support those ligaments will contract, and with sufficient strength to hold the articulation in its proper relative position when subjected to the weight of the body. As far as my experience goes, the spinal column differs in no way beyond that of its position and consequent peculiarities from any other articulation, with this exception that I never met with a paralytic condition of its muscles in these cases: and if from general debility the muscles are rendered incapable of supporting it, the ligaments of the spine will not form an exception to the general rule, but will yield, and admit of a deviation from the perpendicular position, which, as I have pointed out to you, becomes rapidly increased in consequence of the mechanical cause, namely, the superincumbent weight of the head and shoulders being constantly in operation. Therefore the object we have in view is simple enough, namely, to *support the column in such a manner that at the same time the deformity is either cured, relieved, or any increase of it prevented. The patient shall be allowed to follow her usual avocations, and to take such general exercise as is conducive to, and absolutely necessary for, the preservation of health.*

In incipient cases, where the curve is slight and scarcely perceptible, and that only at times, attention to the general health, relaxation from studies combined with change of air and scene, will invariably cure the tendency to deformity.

In cases where the curve is slight, in the form of the Italic *S*, but upon examination is found to be permanent, *i. e.* offers a firm resistance, although yielding to pressure, when the patient is in the horizontal position, even though it be of some years' duration, as a rule it may be perfectly cured.

In cases where the lateral deviation is great, and in which the ribs retain their form, although displaced considerably, provided the patient has not done growing, and that the

spine is found to yield to a great extent when pressed upon by the hand in the horizontal posture, the deformity can at all times be relieved, and not unfrequently cured; no matter whether it be a double or treble curve.

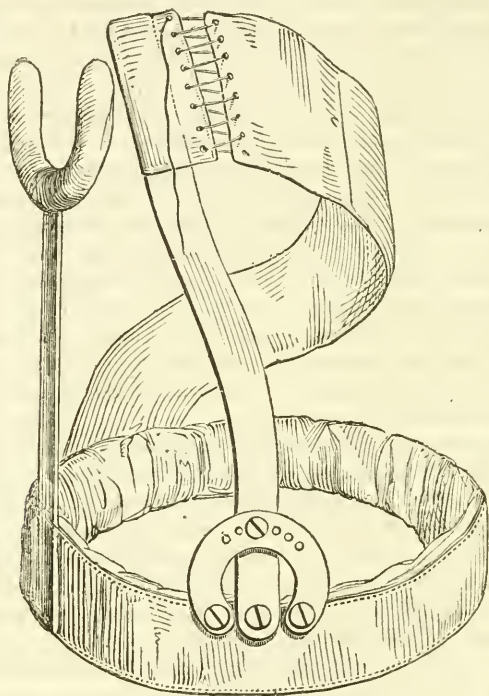
In cases, however, that have passed the age of puberty, and in which the curve is considerable, and the spine upon examination is found to be firm and unyielding, where perhaps ankylosis of a portion of the vertebræ has taken place, but little good can be expected or derived; but, even in these cases, if there is considerable motion above and below the curve, as we sometimes meet with, the deformity may be relieved, and the sense of weakness altogether removed; which to the patient is of great importance.

In rachitic cases, when the bones themselves become altered in form, of course a cure is out of the question. Our efforts can only be directed to apply the most efficient means to put a stop to an increase of the deformity, and, as far as is safe or prudent, relieve that which is already in existence. I say, safe or prudent, because the distortion of the ribs and chest is occasionally so severe, that no one possessing either sense or feeling would attempt the application of such force as would have a tendency to restore them to a *straight* position, which could only be obtained at the expense of fracture of the ribs, or dislocation of the vertebræ.

In the foregoing division of cases I have purposely avoided allusion to the length of the upper or lower curve, whether the one is more or less abrupt than the other, &c. &c., inasmuch as they will be found in every variety, and do not, on that account, alter the indication of treatment: if, however, as is occasionally met with, there is, in combination with the lateral, the antero-posterior curvature, the use of the common back-board, in conjunction with the means to be mentioned, I have found effectual in all cases that admit of cure; and in the more severe and incurable cases, the back-board represented in the last lecture will act as a constant support. The plan that I have adopted, and found so completely successful, is that of Tavernier, of Paris, namely, the use of the lever belt, to which I have added a crutch to support the shoulder on the concavity of the curve (vide fig. 47). This instrument, if properly applied, and carefully kept in its position, will cure any slight case of curvature by the constant support and pressure that it is capable of effecting on the projecting ribs. It must, however, be worn night and day, so that no return of the spine

to the malposition is admitted of; as here, as well as in the deformities I have previously directed your attention to, unless the position is constantly maintained, the ligaments cannot re-contract, neither can any resistance which those on the concavity of the curve offer be overcome: this, therefore, is indispensably necessary. In addition to the use of the instrument, the only exercise that I have thought it prudent to adopt has been the use of a common pulley,

Fig. 47.



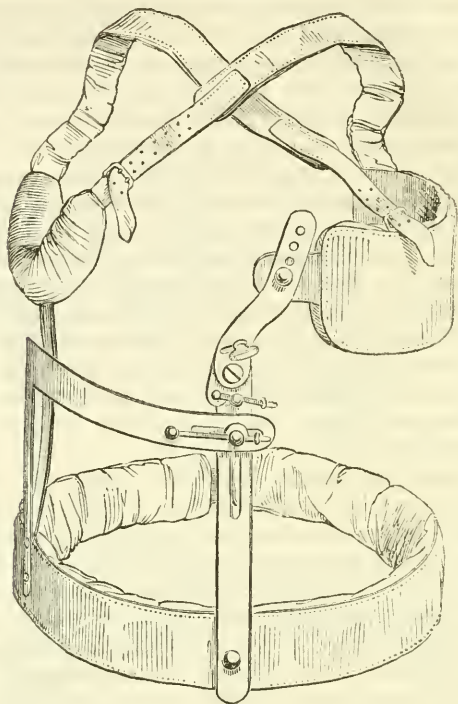
fixed in a convenient position (which is readily done by any carpenter) for the arm, situated on the concavity of the curve, in the following manner. Let the handle of the pulley be fixed at the height of the hand of the patient, when the arm is extended in the horizontal position, whilst the patient is standing, and let the patient stand at such a distance that she can just grasp the handle; then let her flex and extend her arm alternately, having such a weight attached that she can raise without any violent effort, just

so long as she can do this without fatigue. Let this be repeated three or four times daily, directing her, however, to use only the arm, and not to throw the weight of the body on the pulley, as this would diminish the muscular effort. By this exercise the rhomboidel muscles, attached directly to the base of the scapula, and the spine, are brought into a state of activity, and of course increased development — as well the body of the trapezius, and serratus magnus, and the lower portion of the longissimus dorsi and sacro-lumbalis — whilst the muscles in the convexity are rendered so far passive as to be used only in connection with the ordinary duties. I most decidedly object to the exercise of the muscles on both sides of the spinal column, during the time the curve is in existence, as is most commonly done in a variety of amusing and not less expensive ways to the patient, as by so doing a direct obstacle is maintained, and kept in active operation, to prevent the removal of the curvature — a practice so opposed to common sense that one is at a loss to assign a reason for it, and a practice entirely opposed to the course adopted, and found to be of such essential importance, in the treatment of other deformities without exception.

In the more severe cases, then, I have not found the lever belt answer the desired end so well ; as the difficulty of keeping up a constant and well regulated pressure to any extent is so great, from the tilting of the belt, that it requires an amount of attention and watching, that none could devote to it except the friends of the patient, who cannot be expected, in the mass of cases, to carry out the treatment, and without which a cure is out of the question. I have therefore invented an instrument (vide fig. 48), which I have found most successful, the action of which may be compared to that of one hand pressing on the convexity of the ribs of the projecting side, whilst the opposite hand presses in the ileum of the opposite side, leaving the abdomen and chest free, and admitting of free exercise of the muscles at the same time that the pressure is applied to that portion only which requires support ; and as the spine yields, the pressure can be gradually increased, as easily as in the treatment of any one of the distortions I have had to speak of. It consists, as may be seen in the diagram, (fig. 48) of a band which encircles the pelvis, having an upright position attached behind, at the upper portion of which is a moveable pad, so made that it adapts itself to the projecting ribs, and with the screw the pressure can be regulated according to circumstances ; beneath is an arm, which extends to the

opposite side of the band, and which regulates the position of the upright portion, without causing the instrument to be displaced to any extent, by means also of the screw re-

Fig. 48.



presented in the diagram. The use of this instrument involves no sacrifice of time, nor confinement within doors, and enables the patients to take such exercise as they may feel disposed to, and to follow their usual duties, not only without inconvenience, but with absolute comfort; as the support derived from the instrument relieves them of that sense of weakness and pain that is complained of in almost every case of lateral curvature.

In all instances I advise daily walking-exercise when the weather permits, twice or oftener, and that it should be continued so long on each occasion that the patient is not fatigued. The confinement of a school is also to be avoided, as the interval which is allowed for recreation in the middle of the day is far from sufficient to compensate

for the many hours of sedentary occupation to which they are subjected. Objections have been raised to the use of the band encircling the pelvis, from the idea that the pressure upon those bones would interfere with their growth, or alter their shape and form ; and thus offer an obstacle to the process of parturition. This objection has, however, been so ably met by the late Mr. John Shaw, that I have only to refer you to his work, on the treatment of lateral curvature.

With the view of improving the general health, and of giving tone to the stomach and promoting regular action in the alimentary canal, I have given small doses of the decoction of aloes, combined with the sesquicarbonate of ammonia and the spirits of lavender, two or three times daily ; and if the patient is very delicate, the use of one or other of the numerous tonics, as may appear best suited to the individual case, can be had recourse to, together with a nourishing and slightly stimulating diet : with these means I have never witnessed a failure in such cases as admit of cure, nor in any have they failed to relieve the patient, and to improve or restore the general health. I have a patient at this time, aged 18 years, who is afflicted with as severe a lateral curvature, combined with an actual alteration in the form of the ribs, and relative proportion of the chest and abdomen, as can be well imagined — almost as bad as that represented in the last lecture, (fig. 46) — who, by the use of this instrument alone, has been raised an inch and three-fourths in six months, whilst the immense hollow in the side corresponding with the concavity of the curve is very nearly gone. It is not a case which admits of cure, but one in which great good has been effected by the removal of the severity of the deformity. In other instances of slight curvature, I have found the back retain itself in the perpendicular position unaided within three months ; these, however, are cases occurring in patients who have done growing, and in whom there is no alteration in the form of the ribs themselves. Some fifteen months since, I was consulted by two of the same family, both of whom had been afflicted in this way — the one 17 years of age, the other 14 : within three months the elder left off the instrument for an hour daily without any relapse, and at the end of six months she left it off the greater part of the day ; and this was a patient who had long been subjected to the reclining couch, &c. &c., without having obtained any relief. The younger sister has been compelled to continue the use of the instrument up to the present time, in consequence of her rapid growth, although

the spine is retained in the straight position without the slightest inconvenience to the patient, or interference with her usual habits. Two years since, I was consulted by a patient, aged 23, who for five or six years had been the subject of the treatment commonly adopted, that of lying down, &c., when, although the curvature was slight, yet it continued in the same condition. Within three months after wearing the instrument, her back was brought into the straight position, and she commenced leaving off the use of it; which for twelve months past has been omitted the whole day, and yet no relapse has followed. The exercise explained to you has in each instance been followed out.

Section of the muscles has been freely performed on the continent for lateral curvature. I once divided them in a case that admitted only of relief, and with as much success as I could have anticipated: the back certainly yielded quickly, up to a certain point, but the difficulty that presents itself is the great sense of weakness that follows, together with the necessity for the most complete support during the time the ligaments are gaining strength; so that I cannot perceive that any advantage is gained by this proceeding, as I believe any case that admits of relief or cure can be quite as quickly restored without the operation as with it.

In the variety alluded to at the commencement of the lecture, where there is no permanent deformity, I have used 'Tavernier's belt, adding, however, another belt to the instrument, with a view of giving complete support to the lower as well as the upper curve, and also to prevent any lateral motion, so that the ligaments may be allowed to contract upon themselves; and as merely "support" is required, not any amount of pressure, it does not interfere with the exercise of the muscles of the chest or abdomen, and thus the patients are relieved from the necessity of continuing the horizontal posture, without risk of increasing the curve: in this way they are enabled to take proper exercise, and to recover their lost health.

In all cases, before giving an opinion, your attention must be particularly directed to the nature of the deformity, the length of time it has existed, whether complicated with any alteration in the normal form of the ribs, as in rachitis, the amount of motion on pressure being made, and the nature of that motion, whether it is firm and unyielding, or whether, although firm, there exists more or less passive yielding upon a continuance of the pressure, as of course the correctness of your diagnosis depends upon it.

As regards the various modes of treatment that are, and

have been, so long in use, I have nothing to say upon them beyond this, that I believe them to be wrong in principle, and in many instances directly injurious; as, for instance, that barbarous practice of keeping patients for months or years in the horizontal position; for should the curvature be relieved, the first cause of the deformity is kept in active operation, and in fact greatly increased, independently of the sacrifice of time and health; and I venture to hope that by drawing the attention of the profession to the views and treatment I have brought before you, the time will not be far distant before an end is put to such horrible practices.

LECTURE XIV.

WRY-NECK—CONTRACTION OF THE LOWER JAW—CONTRACTION OF SHOULDER-JOINT—CONTRACTION OF THE ARM—CONTRACTION OF THE FORE-ARM—CONTRACTION OF THE WRIST AND FINGERS—CONTRACTION OF THE TOES.

WE come now, gentlemen, to the deformities of the cervical vertebræ, in which two deformities are met with, namely, wry neck and angular curvature. By wry neck is understood a permanent inclination of the head to either side, combined with more or less rotation of the head, the lower jaw being approximated to the shoulder on the side corresponding with the contraction, and raised on the opposite side. This deformity is said to be congenital. It is also non-congenital; the causes of which are, rheumatic inflammation of the muscles of the neck, disease of the cervical vertebræ, and paralysis or loss of power of one or other of the sterno-mastoid muscles; and the contraction of the sterno-mastoid muscles will be found at times confined to the sternal, at others to the clavicular portion.

I have mentioned that it is *said* to be “congenital” purposely, inasmuch as I have not yet seen it in the infant. The patient from whom the cast was taken, as represented in the diagram (fig. 49), was an in-patient of the hospital, aged 18, and stated that he was born with the deformity; so many patients, however, state that their deformities are congenital, which upon minute inquiry are found not to be so, that the simple fact of their saying so must at all times be received with due caution, and in no instance that is doubtful must you be satisfied with the simple assertion of

the patient, or that of his friends. In the case alluded to, there was no paralysis of the sterno-mastoid on the side opposite to that contracted, and the whole of the features

Fig. 49.



appeared to have been irregular. The right eye was certainly higher than the left (vide fig. 49), and the right ear also; the nose somewhat twisted, and the angle of the mouth out of its parallel position. This was so evident that it did not admit of doubt, for after the removal of the deformity, the features presented the same irregularity (vide fig. 50).

Of the non-congenital, the first cause mentioned is "Rheumatic Inflammation," and it appears to arise in the following manner. Patients attacked with rheumatic inflammation of the muscles of the neck suffer the most severe pain on any motion of the head taking place: they therefore instinctively, retain the head as much as possible in one

position, the position which occasions the least pain: and as the exercise of a muscle affected with rheumatism is at all times attended with pain, the muscle or muscles so

Fig. 50.



Fig. 49 after treatment. The patient possesses now, eighteen months since the operation, free voluntary motion in every direction.

attacked are relaxed by the same instinctive efforts by which those on the opposite side are kept in a state of active contraction. If the attack continues for any length of time, the muscles become permanently contracted, and a wry neck is the result. We have two cases attending as out-patients, at this time, with wry neck from this cause.

The next cause mentioned is disease of the cervical vertebræ. This, like all deformities that arise from disease of the articulations themselves, is of course most serious, and will be found to require the greatest delicacy of examination and treatment. The history of the case will generally lead you to suspect it, and by tracing the spinous processes

of the cervical vertebræ you will find that they do not follow one uniform curve, as in the former instances, but that they are irregular, and also that there is more or less thickening and induration on either side of those processes. Pain in the vertebræ themselves is at all times present, supposing the disease to be in the active stage, and if ankylosis, partial or perfect, has taken place, it will, upon inquiry, be found to have existed during the early stage. I was consulted about three years since by a relative in the profession, in a case of wry neck, in which the disease was in the active stage, and was most evident upon examination.

The last cause mentioned is paralysis of one or other of the sterno-mastoid muscles. This is produced by dentition, worms, or any one of the numerous causes which interfere with the health of a child. It comes on insiduously, without any symptom which would attract attention beyond the position of the head; and, as a rule, when a muscle or set of muscles lose their opposing force, those which retain their functions contract upon themselves, and, if allowed to continue in that state, become rigidly fixed in that condition; hence the contraction of the sterno-mastoid in this deformity. Patients thus afflicted present always a painful appearance, for in no case can they look at any object situated on either side of them without turning the body half round, or as far as is sufficient to bring the object in a straight line before them; there is always, therefore, great awkwardness and inconvenience attending it. The features also appear in every instance at variance, from one side of the face being depressed, the opposite raised. The mouth in these congenital cases is drawn down on the side corresponding with the contraction: and frequently the fat and cellular tissue will be found to be much less on the side contracted than on the side which is not contracted, giving the patient a totally different appearance on one side to that of the other.

Treatment. — The treatment of wry neck, like that of other distortions, resolves itself into mechanical, or surgical and mechanical; the adoption of either of which will depend on the condition of the muscle, and the cause producing the deformity. In the congenital cases, if the contraction is rigid, and the muscle on the opposite side retains its functions, you will find it necessary to divide the muscle; and before proceeding to the operation you must carefully examine and ascertain whether the sternal position is contracted, or whether the clavicular attachment is the cause of the deformity. In the case which, at the commencement,

I alluded to, contraction of the sternal extremity *alone* produced and maintained the deformity. I therefore divided it in the following manner. The patient was placed horizontally on his back, or slightly inclined to one side, and his head kept fixed and slightly extended by an assistant. I then with a small scalpel punctured the skin and fascia directly over the inner margin of the tendon, about an inch above the sternum; then introduced a blunt-pointed knife, and passed it behind the muscle, with the flat surface of the knife, towards the flat or posterior surface of the muscle, and as soon as I imagined that the knife extended the full breadth of the muscle, turned the sharp edge towards it, and with very gentle force gradually divided it. I found it necessary to take up one or two bundles of muscular fibres which remained after the mass was severed. As soon as the whole was cut through, the head recovered its position considerably. There is not one operation connected with deformities which requires greater delicacy, or more caution; and in any case that you may meet with, I should advise a similar proceeding. The introduction of a sharp-pointed knife cannot be excused or justified, as independently of any artery, the veins of the neck are at all times numerous, and many small branches pass over the tendon of the sternomastoid, and empty themselves in the subclavian. Report states that alarming hemorrhage has followed the division or puncture of one or other of these veins; it is therefore most desirable to avoid, as far as possible, their being wounded. This can be done if you proceed cautiously, and divide the muscle by the most insensible pressure: so that, as soon as a complete section is effected, you withdraw the knife, without dividing any thing beyond the muscle. In the division of the clavicular portion the same caution is necessary, I may say more so, as there is the external jugular vein crossing it. On no consideration hurry the operation, if you value your own comfort or character on the one hand, or the welfare of the patient on the other. Bold operations attract only those who are ignorant of their profession; and those who venture to obtain notoriety by such proceedings must and do commit at times fatal errors; aggravated because they are done apparently with but one object, namely, their own selfish advantage, which in time will be obvious even to those who for the present are dazzled with the performance.

After the division, place a pledget of lint over the point of puncture, and secure it with strapping and bandage. It is as well also, to pass a circular bandage round the head,

so that any sudden motion may be prevented. In the course of four or five days, or as soon as the puncture is healed, apply your instrument; the one I have used with advantage is analogous to the upper portion of that which is represented in fig. 41, having, however, four springs made to fit the head above, and the lower jaw below, analogous to holding it with the hands, when with the rotatory and lateral motion admitted of, you can gradually bring the head into the desired position. When it is brought to the full amount of extension, direct the patient to exercise it for an hour or more during the day, and afterwards to re-apply the instrument. In this way perfect voluntary power is obtained without the risk of a relapse.

In wry neck, which owes its origin to rheumatism, if the contraction of the muscle is rigid, I would advise that it should be divided; if, on the other hand, there is found to be more or less voluntary motion, the use of the instrument alone will effect a cure. I have a patient now under treatment, who has suffered from this deformity for eight years, in whom the free voluntary motion has been restored by the use of the instrument without operation.

In cases which originate from paralysis of one or other of the sterno-mastoid muscles, the deformity can be removed, but the head cannot be retained by the efforts of the will alone: the patient, therefore in this case, must wear some support constantly.

In cases arising from disease in the cervical vertebræ, the position of the head may be restored, provided complete ankylosis has not taken place, which in children up to 15 years of age I have not found to be the case; but of course, permanent motion is out of the question, and in the mechanical treatment the greatest delicacy is required. The attempts to restore the head to the proper position must be made in the most insensible manner; no violence or force can be used without incurring great risk to the patient.

The articulation of the lower jaw is the subject of contraction in the closed or flexed position; and the only case which has fallen under my observation is that produced by cicatrices resulting from the use of mercury. Some time since I was consulted by a patient aged 11 years, whose mouth was, and had been for two years, rigidly closed. Upon introducing my finger in the angle of the mouth, a dense indurated cicatrix was found to exist on either side, which effectually prevented the patient from opening his mouth in the slightest degree. His mother stated that for the period mentioned he had lived by suction only. Many

surgeons had been consulted, but all had given an unfavourable opinion. I determined to divide the cicatrices by a puncture externally, which was done in the following manner: The patient was laid on a table, the head being supported with a pillow, an assistant holding the head. I introduced a small scalpel perpendicularly upon the middle of the masseter muscle; then withdrew it, and inserted a long narrow blunt-pointed knife, carrying it down to the bone, depressing the handle so that I could pass it horizontally forwards, until I felt the point at the anterior edge of the cicatrix, to the outer side of the mucous membrane, which I was enabled to do by keeping the finger of my left hand within the angle of the mouth. I then turned the sharp edge towards it, and gradually divided the band transversely. By this proceeding the mucous membrane of the mouth was left uninjured, the cicatrix alone being divided; so that there was no possibility of hemorrhage. Pledgets of lint were applied over the point of puncture, as well as over the line of incision, and secured with strapping and bandage. Scarcely any pain followed the operation; and although only one cicatrix was divided, the boy could open his mouth to the extent of about the eighth of an inch.

Four days afterwards the puncture was healed, when I divided the cicatrix on the opposite side in a similar manner, and with a similarly satisfactory result. At the end of four days following the last operation, I applied an instrument made to fit the teeth of the upper jaw, which acted as a fulcrum, and with small narrow blunt steel hooks, which I introduced over the teeth of the lower jaw, and afterwards attached to the instrument by means of a screw, with which I gradually opened the mouth. During the night the instrument was removed, and small wedges of ivory were introduced, to which were attached pieces of tape, so that there should be no possibility of their getting into the mouth or throat. At the end of fourteen days the boy was able to eat any kind of solid food, and, from his mother's account, was eating the whole of the day. He rapidly improved in health and strength, and, with a continuance of the use of the instrument, the cicatrices became gradually absorbed. This, therefore, is the plan I should advise your adopting in any similar case. It avoids the unpleasantness of an open wound, is comparatively painless, and enables you to proceed with the after-treatment before the new matter is capable of offering any resistance.

The shoulder-joint, gentlemen, is of all the joints perhaps the least subject to contraction. I have not met with an in-

stance of it, excepting such as arose from inflammation or injury. In cases arising from either of these causes, the joint has been kept perfectly fixed, and I have not been able to satisfy myself of any decided contraction. The rigidity appeared to be confined to a resistance in the joint itself. There is at all times great pain complained of upon any forcible attempt to move the humerus, and I regret to say that in the cases that have fallen under my own observation the results have not been satisfactory. I have, therefore, not much to say on this subject. There is another condition met with equally unsatisfactory; namely, paralysis of the deltoid and supra and infra spinatus muscles, arising from the irritation of teething, or other cause of cerebral disturbance. The head of the humerus can be distinctly felt, and, with little force, can be dislocated in any direction: as far as an examination goes, no trace of the deltoid muscle can be detected. The joint appears to be covered only with the skin and cellular tissue. The arm and forearm do not, however, suffer to this extent, although in each case there has been a loss of power, and, originally, a perfect paralysis of the entire extremity.

The next contraction that I have to mention is that of the elbow-joint, which, as a rule, you will find contracted in the flexed position, but very rarely in the extended position. They are non-congenital deformities, and arise from inflammation of the joint, following any of the eruptive fevers, rheumatism, disease in, or in the neighbourhood of the joint, injuries of the joint, including fractures of the olecranon, cerebral and spinal irritation, and cicatrices from burns.

These deformities appear to arise from the position in which the arm has been kept during the time that the disease has been in an active state, or whilst the patient was suffering from the effects of mechanical injury; at least with the first four cases I have mentioned to you. There is not in one of them any interruption to the functions of the muscles, or any interference with the efforts of the will, beyond the mechanical impediment in the joint itself. In cases which arise from disease in the joint itself, (most frequently scrofulous disease), ankylosis is the result, whatever may be the position that the joint is placed in; and, of course, under no circumstances can we expect to restore its functions. The arm is generally contracted at right angles (vide fig. 51), with the exception of the last cause alluded to, and will invariably be found to possess more or less motion. In some instances it will appear upon a superficial

to be ankylosed, but, by keeping up forcible extension, pain is produced at the back of the joint, which you may in all cases, where a doubt exists, regard as a favourable indication. In the case from which the diagram is taken, no perceptible motion could be discovered upon keeping up

Fig. 51.

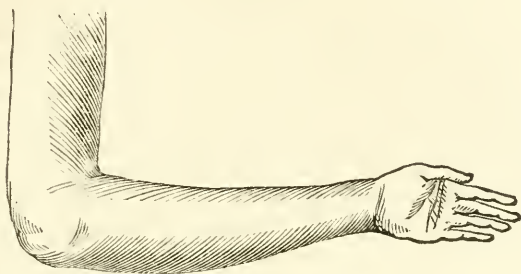


Fig. 52.

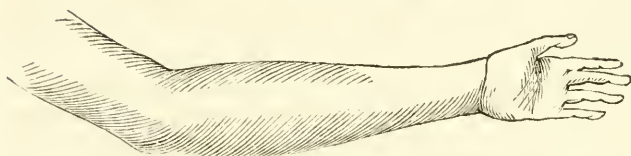


Fig. 51 after treatment. The patient also possesses voluntary power.

forcible extension; pain was, however, complained of in the situation mentioned, and the biceps continued rigidly tense.

In the case produced by cerebral or spinal irritation the joint does not suffer. The contraction in that instance arises from irregular muscular action, whereby the extensors are either paralysed or suffer from a loss of power; whereas, in all similar conditions, those which retain their integrity contract upon themselves, and, if not attended to, become permanently fixed.

The treatment will depend upon the condition of the joint, the cause producing it, as well as the condition of the muscles. If, upon examination, the muscles are found to act under the influence of the will, and there is pain complained of in the situation mentioned, and also if upon keeping up a forcible extension for some minutes the biceps continued rigid, although there is no perceptible motion, or pain in the joint, I would advise a division of the tendon — the mode of doing which is as follows. Let the arm be sup-

ported on a table, and direct an assistant to extend it forcibly, then introduce a small scalpel directly upon the tendon, puncturing the fascia and sheath. Withdraw the scalpel, and insert a small blunt-pointed knife ; and when the knife is upon the tendon, direct it towards the inner edge, and as soon as you can feel the margin, depress the handle of the knife, and carry it horizontally outwards, as far as the breadth of the tendon : turn the sharp edge towards it, and divide it transversely from below upwards. Great care is necessary, as the humeral artery frequently runs close to the tendon, and, in some cases of irregular distribution, is above the fascia. After the operation, secure the point of the puncture with lint, strapping, and bandage, and keep the arm at rest four or five days, or until the puncture is healed : you then apply your mechanical means. I find a common splint, with a joint in the centre, (having attached a male and female screw), answer every purpose, and you will proceed with extension as rapidly as the feelings of the patient will admit of. When the arm is fully extended, direct the patient to flex and extend it alternately with the screw mentioned, and in this way voluntary motion will be obtained.

In cases which owe their origin to rheumatism or mechanical injury, I should advise mechanical treatment, *alone*, provided the contraction is not of long standing ; and in disease of the joint if the joint itself is destroyed, a much more useful limb will be obtained by keeping the joint on a semiflexed position.

In cases occurring from cerebral or spinal irritation, you must be guided by the amount of power in the extensors ; if they are paralysed, no good can result from any treatment. If, on the contrary, they retain their functions, although in a diminished degree, I should recommend your proceeding with the treatment described.

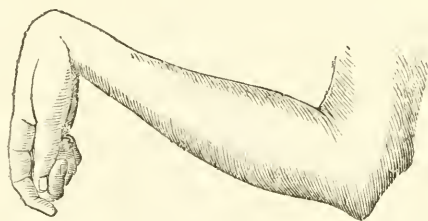
I have a case now under treatment, of a lady, 22 years of age, who is afflicted with contraction of both heels and of both arms, at right angles ; the contraction is not great in the feet. This came on gradually eleven years since, without any illness or any evident interruption to the general health. There is no paralysis, nor interference with the efforts of the will ; the gastrocnemii are, however, both contracted, and the biceps in each arm. It is a case, therefore, which admits of a perfect cure being effected.

The fore-arm is the subject of contraction in the prone position, from any of the causes I have just detailed in connection with the elbow-joint, generally in combination

with contraction of the wrist and fingers. In spasmodic contraction, where every muscle is afflicted, the fore-arm is constantly contracted in that position: I have divided the pronator radii teres, but in all cases, mechanical support is required for an indefinite period; it is not, therefore, an operation I can at present advise being performed, for even should you remove the contraction, the patient will not be in a much better condition.

Contraction of the wrist-joint arises from similar causes to those producing contraction of the elbow. Rheumatic inflammation is, however, a more frequent cause in this articulation than in the elbow-joint. Several cases have presented themselves amongst the out-patients, and there is invariably a thickening of the synovial membranes of the tarsus: so that not only will you find contraction of the muscles, but a great impediment in the joint itself. In all cases where the joint retains its integrity, a restoration to the natural position can be effected; and when the muscles retain their functions, a perfect cure can be accomplished. In cases, however, in which there is paralysis of the extensors, the relief to be obtained is confined to the position of the joint. The case represented in the diagram (fig. 53), was one that occurred in a patient aged about 25,

Fig. 53.



and originated during infancy, from the irritation consequent on dentition. The extensors in that case were paralysed; the man also suffered from talipes equinus, from the same cause. After restoring the foot to its natural position, he expressed a wish to have the wrist straightened. I informed him that in all probability it would not increase the use of his arm; he was anxious, however, to get rid of the deformity. I therefore divided the palmaris longus, flexor carpi radialis, and the flexor carpi ulnaris, as well as the flexor tendons of the sublimus, in the following manner; first, I introduced a small sharp-pointed knife beneath the tendon of the palmaris longus, which was, (as is gene-

rally the case), prominent, turned the sharp edge towards it, and divided it from below upwards; I then introduced the knife on the inner side of the flexor carpi radialis, with the flat surface towards the tendon, passed it directly outwards to what I judged to be the breadth of the tendon, and divided this also from below upwards. The tendon of the flexor carpi ulnaris was divided in a similar manner, introducing the knife on the outside of the tendons; by this mode you avoid the risk of puncturing either the radial or ulnar arteries. I then, with a blunt-pointed knife, picked up, (if I may so express it), the tendons of the flexor sublimis, avoiding the division of the median nerve. The punctures were secured in the usual manner, and allowed to unite; at the end of a week I applied a splint, with a screw attached behind, at the angle at which the wrist was, and by gradual extension the joint was restored to the straight position. Thus the object wished for by the patient was gained, without, however, any increased utility. It is very seldom necessary to divide more than the three first muscles mentioned; if, however, you find, as was the case in this instance, that the flexors of the fingers act as a secondary cause of resistance, I should advise your dividing as many of them as can be got at with safety.

After the joint is brought into its full extended position, direct the patient to exercise it by forcibly flexing and extending it, when the cure becomes perfected, if the muscles are not paralysed. In the rheumatic contraction, forcible flexion and extension must be had recourse to, or the chance of a cure being effected can by no possibility occur.

This is at all times painful, and requires resolution on the part of the patient as well as of the remedial attendant. In some cases of recent occurrence I have found the administration of the hydriodate of potash of great use, both in relieving the joints as well as in improving the health of the patient.

CONTRACTIONS OF THE FINGERS

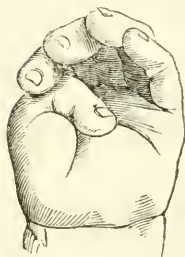
Is a congenital and non-congenital deformity. In the congenital, however, I have not witnessed a case that arose from contraction of the muscles. The cases that I have as yet seen have been occasioned by a deficiency of skin extending from the extremity of the metacarpal bones to the last phalanx (vide fig. 54). I have seen one case of congenital contraction of the thumb in the flexed and adducted position (vide fig. 55): that patient was born with

talipes varus of both feet, and contraction of both the knee-joints. It appears to have arisen from the pressure of the fingers upon the thumb during uterine existence, the hand having been kept very nearly, if not constantly, in the flexed position ; at least this is the only reason I can arrive at. The

Fig. 54.



Fig. 55.



extensors of the thumb are perfectly under the control of the will, and after removing the contraction, acted as freely as if there had been no contraction.

Of the non-congenital, the causes are numerous.

1st, Contraction of the fascia in the palm of the hand, with or without a thickening or nodulated enlargement ;

2d, Contraction arising from injuries either in the palm, fore-arm, or fingers ;

3d, Contraction from rheumatism ;

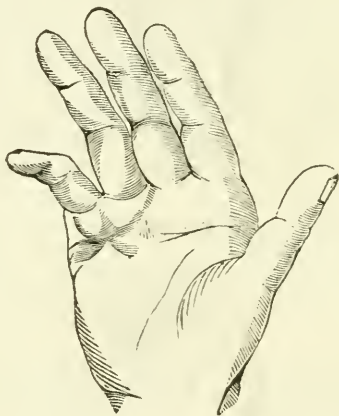
4th, Contraction from paralysis of the extensors ;

5th, Contraction arising from the skin itself, extending from the metacarpal bones to the last phalanx, as in the congenital ; and,

Lastly, We have contraction in combination with a general spasmodic affection of the voluntary muscles.

Contraction of the fascia of the palm is one of the most common causes producing this deformity. It is very frequently met with in elderly people, and not unfrequently in persons of the middle age of life. The contraction comes on insidiously, and without any pain or other inconvenience. The first thing which attracts attention is the inability to straighten the finger or fingers ; generally speaking, the little finger is the first to suffer (vide fig. 56), then the ring finger, and, if it is allowed to continue, the whole become more or less affected, the thumb alone excepted. It appears to

Fig. 56.

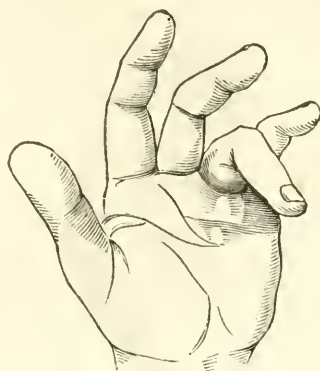


arise from some latent interruption to the general health, and is commonly produced by the too free use of stimulants, either beer, wine, or spirits.

A gentleman consulted me some time since, in whom numerous little nodulated enlargements presented themselves in the palm of his right hand, similar to that represented in fig. 57, with incipient contraction of the fingers. He stated that he lived moderately, took two or three glasses of wine daily, and occasionally beer. I advised him to omit his wine and beer, when, in the course of three or four weeks, these growths diminished to a great extent, and the motion in his fingers was much more free. He again, however,

resumed the use of stimulants, although in moderation, with the increase of the contraction as a consequence. I told him, that if he continued their use he would not only suffer

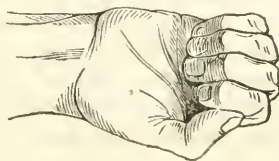
Fig. 57.



from contraction of the fingers, but also that some serious inconvenience might result. Upon this he gave up stimulants altogether, since which time the enlargements in the palm have disappeared, as well as the contraction. It is therefore advisable, on all occasions, to make inquiries into their modes of living, and to give directions to them to avoid any irregularity in living, or the use of stimulating liquors, whether an operation may or may not be necessary.

Injuries to the muscles of the fore-arm, to the hand, or fingers, frequently terminate in contraction. The patient from which this cast was taken (represented in fig. 58), received a severe cut directly across the anterior surface of

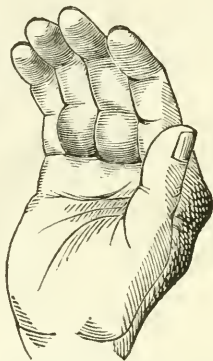
Fig. 58.



the fore-arm, upon recovery from which the fingers were found to be rigidly contracted; there was no want of power in the extensors. I divided the tendons of the flexors in the palm, which were alone the cause of the contraction, and the man recovered the use of his hand.

Contraction from rheumatism (vide fig. 59), affecting the joints themselves primarily, is a much more serious form, inasmuch as a partial displacement is frequently met with, and occasionally a destruction of the integrity of the joint.

Fig. 59.



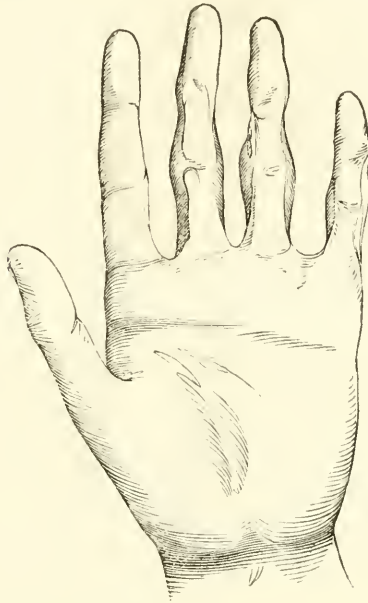
This can at all times be discovered upon examination, and if the motion of the joint is altogether destroyed, of course much good cannot be expected. If, however, there is motion, and not any great displacement, great good can at times be produced. A patient, some time since, was admitted into the House with contraction and displacement of the wrists and fingers; he also suffered from contraction of both knees and feet; his hands were perfectly useless. The fascia in this case appeared to be one of the causes of the contraction, which I divided, and by degrees straightened the fingers. They then became fixed in the straight position, as far as any available use was concerned. I therefore had some springs made to fit each finger, to which was attached a little pulley, so that the patient could flex and extend the fingers alternately, when although the displacement of the articulations could not be overcome, yet sufficient voluntary power was restored to enable him to shave and feed himself, which he could not previously do, and also to dress himself, making him, therefore, comparatively independent.

In cases arising from paralysis of the extensors, of course a removal of the deformity is all that can be expected, and this will depend entirely on the wishes of the patient.

In cases which arise from contraction of the skin (vide figs. 60 and 61), I have found mechanical treatment suffice without operation; and in the last mentioned, namely, those

in which there is spasmodic action of the muscles, but little good can be derived, and that only by long-continued mechanical treatment. In some instances the application of electro-magnetism appears to have relieved the irregular action of the muscles, but in no case have I seen it removed.

Fig. 60.

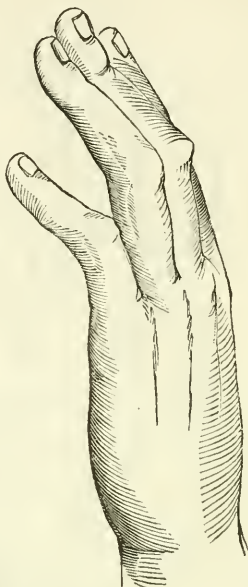


An illustration of non-congenital contraction of the fingers, which arose and was maintained by a contraction of the skin alone, as may be seen in the diagram. The patient was in the higher class of life, so that manual labour had not produced it. No cause could be assigned.

As regards the operation, if, upon examination, the tendons appear to be the active cause of contraction, no matter what is its origin, I should advise the division of them. In all cases in which the sheath of the tendon is free from the extremity of the metatarsal bones, the division should be effected in the palm of the hand in the following manner. Let an assistant forcibly extend the contracted finger, when the tendon will be rendered more prominent; then introduce a small sharp-pointed knife carefully beneath the tendon, confining the knife as much as possible to it, so that any unnecessary risk of dividing the palmar artery may be

avoided ; and when the knife extends to the breadth of the tendon, turn the sharp edge towards it, and divide it from below upwards. Out of the many cases that I have opera-

Fig. 61.



Lateral view of Fig. 63.

ted upon, I have in one instance only divided the artery, using, however, the precaution mentioned. After division, secure the punctures in the usual manner, direct the patient to place his arm in a sling, and on no account to use it. At the end of three or four days you will find the puncture healed ; you then apply your means of extension. I have found a common watch-spring answer every purpose by strapping it to the finger throughout its entire length, and, as may be necessary, adding one or more to increase the power, until the finger is brought into the straight position. Afterwards direct the patient to flex and extend it, and thus the cure becomes perfected.

In cases that arise from injury to the finger itself, and in which the tendon becomes imbedded in the cicatrix, the division must be effected at that point. You cannot, however, in this instance, do more than straighten the finger, as in every case that I have operated upon which has arisen

from this cause, the power of flexing the finger has been altogether lost, and in some cases, when the division has been performed in the finger itself, in which the integrity of the sheath has not been lost, a loss of power has been the consequence ; so that in no instance must the operation be performed in that situation, except in cases similar to that mentioned.

The last deformities that I have to notice are those of the toes.

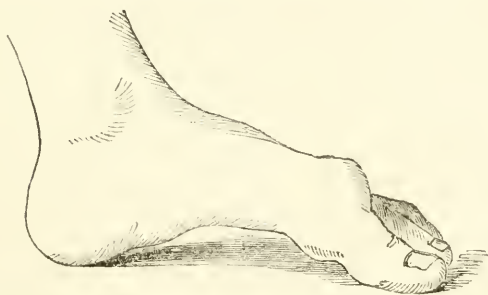
Contraction of the great toe arises from rheumatic inflammation of the joint of the metatarsal bone with the first phalanx, in which case more or less thickening is found in the joint itself, and of course impediment, independently of the muscles.

Chronic inflammation of the joint is occasionally excited from pressure produced by too short boots, when the patient instinctively retains the toe in the flexed position to relieve the pain, which terminates in contraction, as represented in fig. 62.

Contraction of the second toe, as represented in fig. 64, is said to be congenital. The cases that I have seen appear to have arisen from the confinement of the foot in too narrow boots, the great toe being formed outwards, the remainder inwards. In this way the great toe overlaps the second, which, by degrees, becomes contracted in the flexed position.

Contraction of all the toes is not uncommon from rheu-

Fig. 62.



matic inflammation of the joints ; and sometimes a destruction of the joint, with dislocation of the toes on the dorsum, is the result.

They also suffer from spasmodic contraction, in which

the great toe alone is affected, but most frequently the whole of them.

Deformity of the toes is a source of great pain and inconvenience to those afflicted with it, more especially that of

Fig. 63.



Fig. 60, after treatment. The power of flexing and extending the toe is still retained.

Fig. 64.



the great toe, as in the act of progression, when the body is carried beyond the perpendicular line, the weight is thrown on the joint, and produces severe suffering. In some cases no trace of motion could be detected; but, upon using forcible extension, pain is complained of in the joint, and, upon examining the tendon of the long flexor, it will, as a rule, be found rigidly tense. In such cases I have divided the long flexor in the sole of the foot, introducing the knife on the *outside* of the tendon, passing it beneath, and dividing it from below upwards, taking care not to allow the knife to extend beyond the tendon, as by so doing a risk is incurred of puncturing the internal plantar artery. As soon as the puncture is healed, apply your means of extension. For the great toe I have had an iron plate made to fit the sole of the foot, having attached at its anterior extremity a raised spring, to correspond with the position of the toe: the splint is applied by means of strap-

ping and bandage, with which any degree of pressure can be used. The joint is generally restored to its extended position in the course of fourteen days (vide fig. 63).

For contraction of the other toes I have always divided the tendons, as they pass beneath the first phalanx, and used a simple spring, similar to that mentioned for contraction of the fingers. Rest, with the leg *raised*, must be enjoined for the first three or four days, which is generally found to be sufficient time for the healing of the punctures. The power of flexing the toe is of no great moment to the patient; and for this reason the division is advised in the situation mentioned. In all instances, perseverance is necessary in the mechanical treatment, otherwise a relapse follows, and in no case must the spring or splint be omitted until the toe is brought into the full extended position.

Directions should also be given to the patients to avoid the use of any means which may have been the exciting cause, supposing it to have arisen from mechanical causes; and, in rheumatic cases, of course such means as are found necessary to improve the general health, and abstinence from stimuli, or other irregularities in living, must be attended to.

I have now, gentlemen, fulfilled, as far as possible, my intentions, namely, that of laying before you our present knowledge of deformities: the time has not been sufficient for me to have entered so fully into detail as might appear necessary, or as I could have wished, the number of lectures having already exceeded my original plan. I can only say that on all occasions I shall be happy to give you any and every assistance in my power.

INDEX.

- Ankle-joint, rigidity of, at right angles, 84
- Arm, fore, contraction of, 202
 - operation for, 203
- Contractions, spasmodic of the limbs, difficult to treat, 91
 - with paralysis of some of the muscles, 89
- Curvatures of tibia and fibula, 96, 98, 108
 - rachitic, of the bones, 156
 - of the spine, 165
- Deformities, distinguished men suffering from, 10, 11
 - principles for treatment of, by Delpech, 11
 - Stromeyer's remarks on, 12
 - of the feet, 23, 86, 87, 89
 - of the knee-joint, 93
 - of the hip-joint, 146
 - of the spine, 164
 - of the neck, 193
- Elbow-joint, contraction of, 200
 - treatment, 201
- Feet, deformities of the, 23, 86
 - congenital deformities of the, 87
 - non-congenital, 89
- Fragilitas ossium, 164
- Fingers, contraction of the, 204
 - causes of, 205
 - from rheumatism, 208
 - operation for, 209
- Genu-valgum, 93
 - causes of, 94
 - associated constitutional disease, 95
 - with curvature of tibia and fibula, 96, 98
 - with outward inclination of the opposite knee, 97
 - with increased motion of the spinal column, 97
 - progress of, 99
 - causes of, 101
 - treatment, general, 104
 - mechanical, 105
 - surgical, 106
 - risk of dividing perineal nerve in, 106
 - riding on horseback, a part of the after-treatment, 107
- Genu-extrorsum, 108
 - common in unhealthy children, 108
 - always combined with curvature of the tibia and fibula, 108

- Genu-extrorsum, occurs in early childhood, 110
 treatment, general and mechanical, 110
 irons objectionable in, 111
 division of the vastus externus and fascia lata for, 112
- Horse-foot, see Talipes Equinus.
- Hip-joint, contraction of the, 146
 causes of, 147
 treatment of, 150
 operation for, 154
- Jaw, lower, contraction of its articulation, 198
 operation for, 198
- Knock-knee, see Genu-valgum.
- Knee-joint, deformities of the, 93
 contraction of the, in the flexed position, 114
 congenital, 114
 causes of, 116
 non-congenital, 116
 causes of, 117
 changes in the joint, 122
 treatment, 129
 in paralytic and congenital cases, 135
 mechanical treatment in, 136
 contraction of, in the straight position, 142
 variety of, 142
 non-congenital, 143
 treatment, 144
 mechanical, 145
 ankylosis of the, 114
- Pott's Disease, see Spine, Disease of the,
- Palm, contraction of fascia of, 206
- Rachitis, varieties of, 156
 congenital, 156
 associated symptoms, 158
 non-congenital, 158
 aggravating causes, 160
 direction of curvature in, 160
 treatment, 161
- Splay or Flat-Foot, see Talipes-valgus,
- Spine, disease of the, 164
 first symptoms, 165
 accompanying paralysis, 167
 treatment of, 168
 angular curvature of, 171
 treatment, 171
 posterior curvature of, 173
 treatment, 175
 lateral curvature of, 177
 age at which it commences, 180
 treatment, 185
- Shoulder-joint, contraction of, 200
- Tendon, union of divided ends after section, 12
 perfect union of divided ends, 15
 description of union, 17
 Delpech's first case of operation on, 17
 posterior tibial, division of, 21
 precautions to avoid wounding posterior tibial artery, 21
- Talipes equinus, 23

- Talipes equinus, state of the parts in, 24
 causes and cases of, 25, 30
 treatment of, 35
- varus congenitus, 38
 varieties of, 41
 causes of, 44
 paralysis absent in, 45
 complications, 48
 treatment, 49
 early operation advisable, 50
 time of treatment in, 55
- varus, non-congenitus, 57
 treatment of, 59
- valgus, 60
 origin and causes of, 61, 63
 congenital variety of, 62
 non-congenital, 63
 treatment of, 65
- equino-varus, 70
 valgus, 70
 treatment, 72
- calcaneus, 75
 treatment, 77
- calcaneo-valgus, 79
 combined with paralysis, 80
 treatment, 83
- Toes, contraction of the, 211
- Vertebræ, cervical, deformities of the, 193
 varieties of, 193
 causes, 194
 treatment, 196
- Varus, 38, see Talipes varus.
- Valgus, 60, see Talipes valgus.
- Wrist, contraction of the, 203
- Wry-neck, see Vertebræ, cervical, deformities of the.

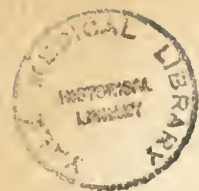
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